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THE MONIST

PHILIP EDWARD BERTRAND JOURDAIN.

THIS journal has suffered another great loss in the death, on October 1, 1919, of Mr. P. E. B. Jourdain, M.A., who has been the English Editor of *The Monist* since 1912. Following so soon on the death of Dr. Paul Carus this loss is especially felt. Certain aspects of Mr. Jourdain's work will be familiar to all our readers; but his genial personality, the extraordinary breadth of his interests, and the humorous kindliness which endeared him to all his friends, it is more difficult to convey to those who had not the good fortune of his personal acquaintance. It will, however, be our duty in this notice to try to give some impression, slight and incomplete though it may be, of the man himself and of his work.

Mr. Jourdain was born on October 16, 1879, and comes of a distinguished family possessing, as the name implies, French antecedents. He was the youngest son of the late Rev. F. Jourdain, Vicar of Ashbourne, Derbyshire. Even before he went to school he showed that characteristic interest in the strictly logical interpretation of ordinary speech which was the foundation of his mature wit; and in his school-days at Cheltenham College he soon developed the combined interest in mathematics and science which was to decide the main trend of his thought. I have been privileged to see the exceedingly interesting memories of these earlier years which have been so charmingly set down

by his youngest sister Milly. These memories not only picture with evident truth the characteristics which were to make the man, but also possess in themselves intrinsic value. With Miss Jourdain's permission certain parts of them are here given.

Among the cold, green Derbyshire hills the river Dove flows swiftly through its dales—valleys of steep, grass-grown hills and sharp, gray limestone rock. Sometimes masses of bushes and small trees grow near the water; the cold mist blows there in the winter, and even in the summer it is green and cool. When the river has left the dale it passes through tamer country, by flat fields and under old country bridges of graystone, till it comes to another exciting place, a rushing weir. The swiftness and noise with which the water slid down the weir-bank and into the green depths below had a great fascination for me, and yet I was so frightened of it; as if all the river's evil spirits were shouting and yet could not get free. About a mile from this river, in a gabled graystone house on a hill overlooking the market-town which lay along the next valley, Philip and I were born and lived for more than our childhood. Water was always so important to me, and to him too I think, so that we could hardly rest till we had seen the river or the sea in any new place, as if any water had a living connection with our river.

The garden, which was on the hillside all round the house, was of course the most friendly and familiar place to us both. I do not know if an outsider would have found it so interesting: there were stretches of rough grass—set for hay in the Spring—with pines, and yews, and deodars planted here and there; a sloping mown lawn in front of the house, a big kitchen garden at the back, and by the side a friendly bit of mixed wood where there was a swing and piles of wood and fowl-houses. It was here that we used to build huts round the trunks of trees with branches pulled from the piles. Philip told me one day that he had found some planks left over from building a wood-shed, so we went there when the gardener was out of the way and silently carried them off to our hut-making place. We pretended we were travelers shipwrecked on a tropical island, and this game lasted through many summer holidays —we hunted wild beasts on half-tamed zebras, and when the dinner

bell rang and we ran indoors we sat at the table breathless and quiet, anxiously waiting for the moment when we could rush off and Real Life begin again. At the bottom of all was a tennis lawn, a flat mown place like a lake among the rough grass banks with evergreens dotted about them.

We both had our own gardens up at the back of the house. They were in a shady place, especially mine, and nothing much grew there but two stick-like plum-trees, grown from stones, and some lung-wort. Philip's was in rather a better position, but he took no interest at all in any plant, so here again there were patches of lung-wort. We used it as a graveyard for any stray dead animals, such as ducklings and mice. There was still a space in his garden, and he suggested that we should dig till we came to the middle of the earth and see if it was burning hot. So we dug down about a foot; then I got in and said excitedly that I could *feel* it getting warm, but when Philip got in he felt no difference, and our enthusiasm for digging soon failed.

Later on we had better gardens near the front of the house, where there was more sun and the ground seemed better. We both liked the gardener, though he found Philip's wits rather too sharp to live with comfortably; but once I remember William got the best of an argument. William was a misogynist and Philip said: "But William, if people didn't marry, there'd be no children."

"There's enough children to last *our* time, Master Phil," said William and went on digging.

If we went down the field-path and through the churchyard we came to the road over the stone bridge. This was where I liked to run on in front and hang over the side, watching the muddy stream below until whoever was with me came up. Then we passed the little, wooden toy-shop, a lovely place full of cheap toys, dogs and common dolls, wooden horses with cylindrical bodies and many penny toys, fascinating to look at even if you had no money to spend. The old man who kept this shop had a long, gray beard, and a black velvet skull cap—enough to make me think him a magican. He was a clever old man, much interested in photography and a friend of Philip's. When Philip went into the little room behind the shop —where there was a skylight and a big stand-camera and artificial backgrounds for taking portraits—to talk to the old man, I would have a thorough inspection of the toys. This was the only shop before we came to the station—a delightful place to explore with

Philip. I used to follow Philip into the signal-box and even on to an engine and listen to his friendly technical talk without understanding a word; but it was enough to feel how popular he was and to see the grizzled old engine-driver looking at him with much affection. There was a great stone shed where the railway lines went into the darkness; engines went in there like tired animals after the day's work was done, and I thought they must have a jolly time in their house.

The beginning of the town was fine, the huge church with much ground round it, so that no other building could come too near, stood facing the wide street; the gray Elizabethan grammar-school on one side, a raised, cobbled pavement in front of it, and on the other side solid dwelling-houses, in one of which Dr. Johnston used to stay. There was a wonderful feeling of brightness in the light here, perhaps because I always think of it on a fine day—and the inside of the church always seemed to me brighter than any other church. The street grew narrower as we went on and the shops crowded together, but there were curious old bits—the queer cobbled way up the hill to the market, and the sign of the inn stretching like an arch across the road with a Turk's head on the top and the picture of a sportsman in a green coat hanging below.

At the end of this long street there was a big house with grass laid round it, old enough to be haunted but not otherwise interesting. Philip and I once stayed here, and though we saw no ghost I was much afraid at night, for my room was on a higher floor than his and the people all seemed grown-up and remote. I had a bath in my room at night and I dragged it up behind me for protection when I knelt to say my prayers, thinking that the ghost might at least fall in the water first.

It was September just before Philip went back to school, and every morning we could go through the shrubbery to the big pond where the early mist lay thick and watch the wild ducks down on the still gray water. When the sun had dried the soaking grass we wandered about freely and boldly explored the haunted avenue in the daylight and then went on to see the farm.

Most of my knowledge of that country was taken from the point of view of the road and the hedges; for when a child is small there are so few chances of seeing above the hedge line. The land by the river, which lay behind our house, I knew well, for there was no road and we always went through the fields. I love to remember

the lie of the land there, and how the pleasant low hills rose beyond the flat, green fields on the far side of the river; the sun is always shining there, glinting on the water and on the white stones where Philip and I tried to wade across. When I was at school and Philip at home reading, he used to follow the hounds over the misty hills in the winter and was often out all day. He used to tell me how he would leave home in the early dark and walk miles to the meet, and how once he was lost and walked over great stretches of new country till he came to a shepherd's cottage, where they gave him tea and offered him a sheep-dog puppy and showed him the way home. He told me how good it was to take one's boots off and eat and then read by the fire.

As I first remember Philip he was a little brown-haired boy in a dark-colored sailor-suit, slightly built, with a great look of intelligence and an open, pleasant expression, but also an air of delicacy; and sometimes his whole face was clouded with nervousness and even his shining gray eyes looked frightened and his mouth irritable.

He was always more ready to use his brain than his hands and feet, for even quite early he was slightly clumsy and easily thrown off his balance. He was quite aware of this and it made him irritably ready to tease even his elders, for he knew it was the only weapon he could successfully use. He was timid and avoided danger if he could, but if it was there and unavoidable he behaved with courage and coolness.

He was sociable and talkative and never shy. He was fond of drawing, chiefly battle pictures, with quick and lively effect, but he never seemed to spend much time or trouble over them. When he went away to school he began to learn to play the piano, but he never was clever with his fingers, and he was more interested in the kind of brain-work which he did so well. But he became passionately fond of listening to music. When quite little he would lie under the pianoforte with me when it was played, and when a schoolboy I remember his serious face when listening to the fine organ after church.

My father was devoted to Philip, and I well remember, when some stranger was present, he would place his hands on Philip's shoulders and, looking immensely tall, would say with loving pride, "My son, Philip."

When we were still quite young and slept in the same room, we generally told each other stories, but sometimes had a game

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Philip had invented. He would say, "Let's play who can name the highest number." Then one would name a number such as three, and the other would say "Ten," and so on. When we came to a thousand I began to get nervous, for I always got muddled among big figures and could not remember which was the bigger—a million or a billion. One night he called out, "I name a number higher than whatever number you name." I turned this over and over and then said, "Well, I name one higher than that." "You can't, you can't," sang Philip, self-satisfaction shining all over his face, "I've won, I've won."

"But Philip," I said, nearly crying with exasperation, "you haven't won, *I said one higher than that.*"

"And mine is always the higher."

So then I sulkily pretended to sleep.

Another time, I was lying awake rather troubled by a housemaid's idea of heaven—living for ever and ever in a white gown and singing hymns. I called out, "Phil, can things go on for ever and ever and never have an end?" He said promptly, "A circle has no end," and I hoped I should not die.

He was fond of setting small logical traps for me. For instance, once he said, "All people tell lies once in their lives, don't they?"

"I s'pose so."

"Then," he said triumphantly, "Mater has told a lie!"

"No she hasn't!" I said indignantly.

"But can't you see that it must follow?"

No answer.

The presence of most strangers, preferably grown-up, generally had a great effect on Philip. He knew he had much power of charm and clever talk, and was keenly aware of his lack of physical power. When we went to children's dances, he always went unwillingly and was obviously bored all the time, unless he could get some one to sit out with him.

When Philip first went to school he was fairly happy, I think, though he always minded the actual leaving home. I remember a day or so after he had first gone, my father came into the room where my mother and I were sitting and said he had just heard from B. (the headmaster) that Philip fell on his feet at once. Sometimes my mother and I went with him in the train to the next station—a mile off—and then walked home: once I remember his misery growing and growing during the journey till he burst into

tears when he said good-bye to my mother, and then I saw his crying face at the window of the train until it all quickly disappeared.

Some of my happiest days were spent staying with Philip out of term, at my sister's schoolhouse where I was to go later. The house was big, and we thought it luxurious, for there was a bathroom, and thick carpets in the bedrooms. What most pleased me on the first night was to find not only a candle by my bed, but a box of matches which I could strike in the night—and did.

There was a fair-sized town, with modern villas edging the flat roads and stretching far into the country. Here we had a mail-cart and he used to push me in it for miles; for, without saying anything to each other, we both knew that I found in difficult to walk as far as he could, and he found it steadied him to push me and made it easier for him to run.

One day we were coming along a road where there was nothing in sight but an old woman with a big basket of washing. Philip said, "Shall we give her basket a lift?" So we stopped, and I got out and we hoisted the basket on while the old woman thanked us: we took it as far as she wanted, and the old woman covered us with blessings while my brother swept off his cap and we ran away.

Later, when he went to a public school, he was obviously not happy, though he never told me so; he always seemed glad to throw off the school atmosphere and come back to our old life in the room we still called the nursery. There was often a strained, protesting look on his face as if he was remembering. But he did well in his work and brought back many prizes, a keen interest in chemistry and electricity, and many bottles and batteries. The nursery shelves were now filled with chemicals, and my animals had to leave plenty of room on the chest of drawers for retorts and induction coils. He taught me with great clearness some elementary chemistry (which I had to write down in a book) and also the use of all the apparatus.

I suppose most clever people when they have learnt or discovered something wish to explain it to some one else; Philip had this wish strongly and explained things well even when a small boy. At first he was too eager to be patient with a sister, but he grew more and more so. Any one who knew him when he was grown up would know that he was always ready to explain with extraordinary patience. I remember when he was eight years old, and began to learn Latin at a day-school, he used to teach me Latin declensions

in bed before breakfast, his eager little figure in its Jaeger night-shirt and pink face all alight with enthusiasm. I was not at all a willing learner, being simply bored with such early lessons, and I found it no more interesting than the multiplication tables which were just then worrying me.

The electricity I was content to take as a mystery and learn rather like a parrot. When he was arranging some bottles he said: "Always throw away the stuff in any unlabeled bottles."

"But if you're *sure* you know what's inside?"

"You *can't* be sure unless you have a proof like a label."

"But if—"

"O shut up," he snapped, "you must always throw it away."

I loved touching the thin-necked flasks and test-tubes and helping to make experiments. He rarely allowed me to pour out acids; we had three bottles of them, hydrochloric, sulphuric and nitric, and he gave wicked personalities to them, so that I used to stand and look at the queer, thick liquids as if they were really devils that were kept in those stoppered bottles.

Philip had many catalogs from chemical manufacturers, and we used to pore over these and make lists of what we would buy if we had five or ten shillings to spend.

About two years afterward we again stayed at the schoolhouse out of term, but now I was really part of it; also there were two girls staying there for the holidays whose parents were abroad. Before Philip came I had talked so much about him, that when he really did come I was a little nervous as to whether he would come up to the high standard of brilliance I had set for him. But all went well; the girls admired his jokes and talk and looks.

We four went up to London to the Zoo one day; this was the place Philip and I liked beyond any other in London, and the girls came because we wanted them so much. Philip enjoyed it as much as I did, but much more sensibly; he talked to the keepers, who seemed to like him as much as the engine-drivers always did.

When he left school I was still at mine, and he used to send me wonderful "magazines" written and illustrated by himself on a sheet of note-paper, telling me all the small news of our home. There were often photographs of animals "given away as a supplement to the number," for chemistry had now grown into an interest in photography.[1] He was very thorough about all the details of

[1] This interest is reflected in Mr. Jourdain's first papers, published while he was still an undergraduate, on "Colour Photography."

developing, and was much more particular about washing a plate than about washing his own hands, and tried hard to make me so.

This thoroughness in his work never left him. And though he had enthusiasms, for toys when he was little and for people when he grew bigger, which rapidly cooled, yet his enthusiasm for scientific work never did; and he made me feel, even when we were only school-children, its undying importance.

After our father died, we went to live in a little house at Cambridge so that Philip could live with us and go to college. I was still at school but saw him in the holidays, looking so fine, I thought, in his dark blue gown, and happy as long as his College library was open; I used to feel nearly bursting with pride as I helped him on with his gown and stroked its shining folds. He took me to see this library, and showed me where he worked in a huge underground room. He got me botanical books and left me; when it was time to go, I heard his rather quick, uncertain step on the stone floor as he came to my table. He gave me his arm and we went out together up the stairs, along the echoing cloisters and down the rounded stone steps from the dining-hall where there was nothing to hold on to; there was a horrid, breathless minute and then we were safe on the pavement, the Great Court stretching far round us in all its ancient quietness, so that buildings which lay along its sides looked small till we came up to them.

I left school at Easter and came home, so that now I could see him in the term time when he was much busier, often hurrying to lectures, his face looking strained with too much walking. But he looked so happy when he spoke of the jokes and tales in other men's rooms. I got to know them all by name and the different places where they "kept."

I suppose most undergraduates do not tell their mother and sister more than they can help, but Philip was so happy in the bit of life he had got, though he must have felt how incomplete it was, that he simply overflowed to us.

Sometimes he would give tea-parties himself in our dining-room, and I could hear his friends, through the bathroom window, singing the song of how the animals went into the ark and how the Englishman

> "Was marr-i-ed
> To a mer-ma-id
> At the bottom of the deep blue sea."

to the tune of "Rule Britannia."

Our old nurse Rebecca had married an elderly gardener with a grave whiskered face. He worked at a nursery near, but when he was free I delighted in showing them both round the Colleges, the library where Philip worked and so on. But what old Frank most admired was one of the evergreen trees in the grounds of St. John's: he stood, his head thrown back and his hands clasped behind his lean back, and said, "I never *see* such a Wellingtonia." The next best things were the bright-colored geraniums in the window-boxes of the gray old Great Court.

In July I went abroad to a hospital in Heidelberg for a cure, and in September Philip and my mother followed, for there seemed some hope.

When he came into the hospital a little later, we had a pleasant life; we had meals in my room because it had two windows, and sometimes he would tell me about his work; he said with enthusiasm that he was going to write a *Geschichte der Mathematik* as he called it, for he always liked using foreign words. We had what was to be nearly our last bit of walking together here.

Philip often wrote ridiculous verses on small incidents which happened at the hospital. I copied them all out and gave them to the Doctor when he came to see me in the mornings, and he was so absorbed with merriment that he sometimes nearly forgot to stop the electric current. He once said to me that he always supposed that I also was partly author, and I afterward told Philip that that was the hardest thing I had ever had to deny. He also wrote a long ballad, in English, called "Les Voyages de M. R."—about the imaginary travels of that old man in search of health. This was the first verse:

"Herr R. has traveled far and wide
For treatment of his back,
But then I greatly fear that he's
A hypochondriac."

I saw them sitting side by side on the sofa when Philip, with flushed face and many gesticulations, translated this freely into French and Herr R. with his sad, yellow face and dusty, black figure, listened with great attention. To our surprise he liked it, and would repeat the end in a wonderful accent—

"He dotes on el-ec-tric-i-ty
And loves to be suspended."

Soon afterward we returned to England. But we now had a fine memory between us of a queer, foreign, exciting life which was kept alive a good deal by Philip's imitations of our acquaintances there. He was always a wonderful actor and would throw his whole mind and body into his roles.

It is quite evident that there was a strong and lasting bond of sympathy between the writer of these memories of childhood and youth, and her brother Philip. The fact that both early developed symptoms of the progressive paralytic condition known as Friedreich's ataxia may have served to strengthen this bond. The visit to Germany for treatment mentioned above—with its consequent break into Mr. Jourdain's academic career—was not however wholly lost; for he returned from his travels a fluent and scholarly linguist. Moreover his growing physical disabilities failed to have the effect they would have produced on a man of less caliber. The amazing output of first-rate original work in the next few years bears witness to this. The following account, which does not claim to be exhaustive, will give the reader some idea of this early activity. In 1902 and 1903 he was at work on an important paper (published later in 1905, in *Journ. für Math.*) on the general theory of functions in which he showed that not only function but also continuous function could be conceived in a purely ordinal manner. In 1903 appeared "A General Theorem on the Transfinite Numbers of Aggregates of Functions" in *Phil. Mag.* In 1904 two further papers on similar subjects in *Phil. Mag.*; papers in *Mess. of Math.*; and the first of a series of papers in the *Quart. Journ. of Math.* on the general equations of mechanics. In 1905 appeared original papers in *Phil. Mag., Math. Ann., Journ. für Math., Mess. of Math.*; together with the thesis for which he had been awarded the Smith's Prize and which was printed in Crelle's *Journ. für Math.* In 1906 Mr. Jourdain was elected to a university scholarship—the Allen—being the

first I believe to hold it for pure mathematical work. Enough has been said of the work of these years, 1902-1905, to show that it was a time of immense activity and fruitfulness. They were, moreover, followed by many years of equal productivity. Only an indomitable will to rise above all physical drawbacks could have enabled him, by steady work, to produce so long and so valuable a series of contributions to knowledge. In giving a true picture of the man and his work it has been necessary to speak of those drawbacks, and to refer to the partial paralysis from which he was destined to suffer throughout the rest of his life. But to all who came into personal contact with him his physical disabilities at once faded into complete insignificance in face of the obvious greatness of the man himself. His overflowing mental energy and his frank and generous spirit overshadowed everything else and combined to impress upon all who met him that they were in the presence of one of the most stimulating men of his time.

Based on his early work, and developing along the two main lines of interest which appear in it—namely, the theory of aggregates and analytical mechanics—were a large number of papers between 1906 and 1913. But the two lines of interest were not isolated from each other; they reacted reciprocally. Thus in the first article he wrote for *The Monist* ("On some Points in the Foundations of Mathematical Physics," 1908, XVIII, p. 217) Mr. Jourdain attempted the exact formulation of certain fundamental conceptions of mathematical physics, such as causality, by the application of results he had reached in the mathematical theory of aggregates. This article, moreover, shows the beginnings of that keen interest in the logical and philosophical foundations of science which characterizes all his later work. Of the technical papers on mathematical subjects which fall in this period special reference should be made to the long series of articles on "The De-

velopment of the Mathematical Theory of Transfinite Numbers" which began in the *Archiv der Math. und Physik* for 1906 and continued to 1912. This series forms a complete and scholarly history of the whole subject and is well worthy of translation and re-publication. Another noteworthy set of papers is the series in the *Quart. Journ. of Math.* on "The Development of the Theories of Mathematical Logic and the Principles of Mathematics." Of these the 1910 paper deals with the logical work of Leibniz and Boole; the 1912, with the work of MacColl, Frege and Peano; and the 1913, with Jevons. These two series of historical papers, together with the historical one ("Fourier's Influence on the Conceptions of Mathematics") of the three papers which he read at the International Congress of Mathematicians at Cambridge in 1912, exemplify Mr. Jourdain's growing concern with the history of mathematical ideas.

It is necessary to turn aside for a moment at this point in order to make it perfectly clear that this historical aspect of Mr. Jourdain's work did not involve any falling away into psychological logic. His belief in the objective nature of the world of universals studied in mathematics and logic remained unshaken. This is obvious from his humorous castigation, in his last book—*The Philosophy of Mr. B*r-tr*nd R*ss*ll,* 1918—of the psychological logicians. Speaking ironically of them he says (p. 88), "I sometimes feel inclined to apply the historical method to the multiplication table. I should make a statistical inquiry among school-children, before their pristine wisdom has been biased by teachers. I should put down their answers as to what 6 times 9 amounts to, I should work out the average of their answers to six places of decimals, and should then decide that, at the present stage of human development this average is the value of 6 times 9." Yet, holding as he did that "history is irrelevant to logic, that the truth or falsity of

a proposition is independent of the way in which so-and-so discovered it," he could still recognize that the world of universals in all its clear-cut immutability is only reached by a long *process* which is not wholly logical. The distinction which he made between the process by which we reach the final logical objective and that objective itself enabled him without inconsistency to sympathize with Poincaré's insistence on the synthetic and intuitional mode by which mathematical discovery advances, and yet to dispute that writer's claim that the final result is tainted by its psychological origins. In his last paper, on which he was engaged when he died, Mr. Jourdain gave an admirably clear account of the importance and true place of the historical process of discovery. "Nowadays," he wrote, "we can see clearly that the subject-matter of what we call 'logic' and 'mathematics' is a set of primitive ideas (or ideas which are incapable of further analysis) and deductive relations (which enable conclusions to be drawn without any appeal to experience) between these ideas. For the purpose of description in a way which shall economize the labor of thought as much as possible, we arrive at 'concepts,' which might be described as definitions of complex ideas and relations. Certain of these concepts were early perceived more or less vaguely. The vague images formed of the concepts by various people may be called 'ideoids.'" The distinction which Mr. Jourdain here draws is the same as that made between a "concept" and a "conception" in his paper "The Function of Symbolism in Mathematical Logic" (*Scientia*, 1917, XXI, p. 4). But it is, he suggests, less ambiguous to retain "conception" for its common usage as meaning the *formation* of what he now calls "ideoids." He continues, "The chief problem of the history of science seems to be that of describing as nearly as possible the various ideoids that have appeared from time to time." It is difficult to know when the psycho-

logical impurities—which, mixed with concepts, give the alloys called ideoids—are completely removed. And that is why the history of a science is of use even to the logician. Nevertheless, we must not forget that the impurity is different in nature from the pure stuff of concepts. "Concepts," he urges, "are not *formed* by people, but *discovered* by them." "On the other hand, ideoids are so formed; because they are just the vague notions that people form of concepts. Most people have a vague feeling of important concepts....In any historical view we should try to give greater distinctness to the vague notions which nearly everybody possesses; and this problem, which is not unlike that of the poet who seeks to give expression to the ideas held obscurely by a large number of those of his own country, is of importance at the present time, because examples of the discovery of concepts which lurk in ideoids is a constantly recurring problem of science." The history of science may therefore be of use even to the logician and original worker; and is certainly of value to the teacher. It is as great a mistake, wrote Mr. Jourdain in *Mind* (1916, 25, p. 526), to "banish from teaching a discussion of the growth of ideas as it is to try to build a house without scaffolding on the ground that the scaffolding is not part of the building."

We must now return to the middle section of Mr. Jourdain's work, stretching roughly from 1906 to 1913, with which we were dealing. It was toward the end of this period, in 1912, that the late Dr. Paul Carus, while on a visit to the Congress mentioned above at Cambridge, met Mr. Jourdain and invited him to become the English Editor of *The Monist*. By this happy choice Dr. Carus was able to open up an extended sphere of influence for this Journal, and for the philosophical and scientific publications of the Open Court Publishing Company. A list of Mr. Jourdain's *Monist* articles is appended to this notice. It will be noted

that it was in this Journal that Mr. Jourdain published the series of papers on Newton which has made him the recognized authority in this field. Besides the editing of several volumes—including De Morgan's *Essays on the Life and Work of Newton*, Mach's *History and Root of the Principle of the Conservation of Energy*, Cantor's *Contributions to the Founding of the Theory of Transfinite Numbers*, and Boole's *Laws of Thought*—Mr. Jourdain also initiated the new series of Classics of Science and Philosophy. His translation of Mach's great work on *The Principles of the Theory of Heat* was completed just before his death. These labors stretched therefore over the remaining period of Mr. Jourdain's life from 1912 onward. But they by no means complete the tale of his work. He wrote, for example, a large number of encyclopedia articles, both of a technical and a popular nature. His little book on *The Nature of Mathematics* (first published 1912; new edition 1919) is a well-known and much appreciated example of his power to make abstruse subjects clear. He contributed articles on the historical and philosophical foundations of science to an exceptionally wide range of learned journals: to *Mind*, to *Scientia*, to *Isis*, to Dr. Singer's *Studies in the History and Method of Science*, to the Hastings' *Encyclopedia of Religion and Ethics*, and to the *Hibbert Journal*. In addition he felt it his duty to spare an immense amount of time from his own work to the thankless task of abstracting mathematical literature. This labor he gave cheerfully because he felt it to be an essential to mathematical progress; he therefore contributed abstracts to the *Jahrbuch* and to the *Revue Semestrielle*. In January, 1916, he began the series of well-known summaries of "Recent Advances in Mathematics" to *Science Progress* which was so valuable a feature of that journal. All who have made use of this part of Mr. Jourdain's work owe him a debt of gratitude. His encyclopedic knowledge of mathematical

literature, and his sense of the interconnectedness of the whole field, ensured its scholarly accuracy and completeness. Mr. Jourdain also contributed abstracts of current literature, to *Mind*, *The Monist* and *Isis*. He had also, at the time of his death, been for some years English Editor of the *International Journal of Ethics*.

It would, however, be a complete misconception of Mr. Jourdain's character if it were imagined from this record of his vigorous intellectual activity that he was merely a learned pedant wholly immersed in the things of the mind. He was, as well, a many-sided and lovable man, full of human kindliness and never-failing good humor. His intellectual interests, it is true, often directed his wit—which though caustic was always genial, and as refreshing as a cold bath—into logical channels. *The Philosophy of Mr. B*rtr*nd R*ss*ll* is full of clever and amusing illustrations of logical problems; and the article in *Mind*, "The Flying Arrow: An Anachronism," is an admirable example of his instructive fun. But in addition to these playful portions of his more serious labors Mr. Jourdain produced a great amount of the "literary work" which he stated to be his form of "recreation" in *Who's Who*. The boyish power of pointed and satirical versification which Miss Jourdain describes, found a natural outlet, when he went to Cambridge, in the ever exuberant field of university journalism. The contributions, both poetic and otherwise, of "P. J." to *The Granta* became at one time quite a feature of that journal. Perhaps his most successful series was that entitled "Some Unconscious Humorists of the Nineteenth Century." These included, among others, William Wordsworth, Mrs. Humphrey Ward, Thomas Carlyle, Sir Oliver Lodge and Miss Marie Corelli. These articles are not only extremely good fun, but also contain sufficient solid criticism to justify the hard knocks he so joyously delivers. Thus he quotes Carlyle's dictum "Not our Logical, Men-

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surative Faculty, but our Imaginative is King over us, I might say, Priest and Prophet to lead us heavenward, or Magician and Wizard to lead us hellward." This he comments on as follows: "Carlyle's works read like too-literal translation of chaotic German, and, by this curious means, he succeeded not only in partly disguising the feebleness of his arguments, but also in concealing from the superficial reader the fact that his platitudinous-sounding opinions are, as a rule, composed of equal parts of truism and fallacy. . . . If our logical faculty is different from our mensurative faculty, it is ungrammatical to put 'is King' as a statement made about these two things. If Carlyle means that these two faculties are the same, he is wrong; the mensurative faculty has no more to do with logic than the poetic faculty has. Poetry must conform to the rules of logic, if it is to have a serious meaning, and so must measurement; but that is all either has to do with logic." Again, of Sir Oliver Lodge's incursions into theology there is a verse ending:

> "Sir Noll doth think consignment to a place infernal
> Too harsh,—yet some would deem a punishment eternal
> Too short for writing nonsense in the 'Hibbert Journal.'"

Mr. Jourdain's classification of people, in another article, into Blue and Pink—which is obvious once it is realized that Mr. Bernard Shaw is blue, while Miss Marie Corelli and most curates are indelibly pink—is related in idea to his "Dictionary of Received Opinions": for the use of blue people who find it a tactical necessity to learn the language of the pink.

Mr. Jourdain did not confine his witticisms to the point of his pen; his conversation was always well spiced with good things. I remember his hurling the following well-barbed parable at the head of an apostle of Do It Now. "This morning," he began blandly, "I had an amusing conversation with a bluebottle fly. It was buzzing ex-

citedly against the window-pane of my study, and trying to get out. At last, distracted by the noise, I looked up from my work and said, 'What's all this silly row about?' Turning a flushed and angry countenance toward me, the bluebottle replied, 'It's all very well for you logicians, sitting comfortably in your chairs, to talk; but *in times like the present it's Action we want, not thought.*'"

Of Mr. Jourdain's further literary work mention should be made of his delightful *Fairies' Calendar*; his realistic *Dorset Stories*; and his *Cynical Ballads*. Of the latter I cannot resist quoting "The Good Old Times":

"When I was young, said Mr. Bung,
The towns were all countree;
Now, more's the pity, London city
Ain't what it used to be.

There was a fair in Leicester Square,
The rose grew and the lily,
And meadow-sweet in Regent Street
And rustic Piccadilly.

They shot the quail in Maida Vale,
Grew corn and oil and wine,
And barley too near Waterloo;
Trout in the Serpentine.

When harvesting, we lads would sing,
And cast the sheepish eye,
Then merry blades, we'd kiss the maids
That came from Peckham Rye.

Then everybody, helped by toddy,
Was full of wit and gaiety,
And parsons grave would then behave
Exactly like the laity.

Our stock of ale would never fail,—
It stood about in tubs,—
While the Lord Mayor in Berkeley Square
Kept half-a-dozen pubs.

And treat was stood in drink and food,
By gen'rous gents like you....;
'....Well, since you press me sir, why, bless me,
I don't mind if I do!'"

Enough has been said of this side of Mr. Jourdain's activities to make it clear that, besides carving out for himself a world-wide reputation as a scholar, his wit and geniality made him quite a figure in Cambridge life both during his student days and after his return thither in 1911. To his cottage in Girton village came not only eminent mathematicians of all countries but also the contemporary undergraduate. It was here that Mr. Jourdain met Miss Laura Insull, the youngest daughter of the Rev. Walter Insull, whom he married in 1915. In this year Mr. Jourdain finally left Cambridge and spent his very happy married life at Fleet in Hampshire.

Though he was unable to travel, Mr. Jourdain made his influence felt in every part of the world. His extensive correspondence with learned men bears witness to this. Moreover, his work has had well-marked effects in several fields of thought. Not only by his own original contributions, but also by his power of clear exposition of the work of others, he has influenced the development of mathematical logic. Again, a large part of the movement toward a more orderly and systematic organization of the contributions of all nations to the advancement of science is due to his forcible advocacy. Another movement in which his influence is clearly traceable is that toward an alliance between historians and scientists. It has long enough been realized that political history has overshadowed all other aspects of man. The task of creating a general history of civilization and of its basis in scientific advance has not yet, however, received its due share of attention. So long as existing histories of science were mere matters of trivial biographical detail, the value of this new line of work was little recognized. But Mr. Jourdain helped to show that a true history of *scientific conceptions themselves*—and not of particular accidents concerning them—was possible, and desirable from the point of view of both history and science.

He was thus able to exert a definite influence upon the growing movement toward such a history.

It remains to be said that Mr. Jourdain's death came at a moment when he was at the height of his power. He had just claimed to have discovered a proof, which if valid is of the very first importance in mathematical logic, that any aggregate can be well-ordered; he was publishing in *Mind* important papers on "Causality, Induction and Probability," of which only the first is completed; he was engaged on a monumental work on *The History of Mathematical Thought*; and he was working at the great project of the issue of a National Edition of Newton. His untimely death carries with it, therefore, a sense of loss which is more than a personal one. Yet there is something of comfort, to all his friends, to know that this brave soul died—as he would have wished to die—in the full tide of his life-work.

Mr. Jourdain's Articles in "The Monist" (1908-1920).

1908:	XVIII, p. 217.	On Some Points in the Foundation of Mathematical Physics.
1910:	XX, p. 93.	Transfinite Numbers and the Principles of Mathematics.
	XX, p. 134.	A Mathematical Paradox.
1911:	XXI, p. 564.	Some Modern Advances in Logic.
1912:	XXII, p. 149.	Mr. Bertrand Russell's First Work on the Principles of Mathematics.
	XXII, p. 285.	The Principle of Least Action.
	XXII, p. 414.	Maupertuis and the Principle of Least Action.
	XXII, p. 611.	Henri Poincaré.
1913:	XXIII, p. 145.	A Correction and Some Remarks.
	XXIII, p. 277.	The Nature and Validity of the Principle of Least Action.

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	XXIII, p. 353.	Robert Hooke as a Precursor of Newton.
1914:	XXIV, p. 134.	The Economy of Thought.
	XXIV, p. 188.	The Principles of Mechanics with Newton (1666-1679).
	XXIV, p. 515.	The Principles of Mechanics with Newton (1679-1687).
1915:	XXV, p. 79.	Newton's Hypotheses of Ether and Gravitation from 1672 to 1679.
	XXV, p. 140.	The Purely Ordinal Conceptions of Mathematics and Their Significance for Mathematical Physics.
	XXV, p. 234.	Newton's Hypotheses of Ether and Gravitation from 1679 to 1693.
	XXV, p. 418.	Newton's Hypotheses of Ether and Gravitation from 1693 to 1726.
	XXV, p. 633.	Mathematicians and Philosophers.
1916:	XXVI, p. 24.	The Philosophy of Mr. B*rtr*nd R*ss*ll.
	XXVI, p. 415.	Richard Dedekind.
	XXVI, p. 504.	The Logical Work of Leibniz.
1917:	XXVII, p. 142.	Existents and Entities.
	XXVII, p. 460.	Logic and Psychology.
1918:	XXVIII, p. 629.	Galileo and Newton.
1919:	XXIX, p. 450.	The Logical Significance of Ockham's Razor.
	XXIX, p. 453.	Cause and Effect.
	XXIX, p. 547.	Indefinables and Indemonstrables in Mathematics and Theology.
1920:	XXX, p. 19.	The Analytical Treatment of Newton's Problem.
	XXX, p. 183.	Elliptic Orbits and the Growth of the Third Law with Newton.
	XXX, p. 199.	Newton's Theorems on the Attraction of Spheres.

ELLIPTIC ORBITS AND THE GROWTH OF THE THIRD LAW WITH NEWTON.

IN my first article on Newton in this magazine[1] is quoted a memorandum written by Newton saying that in 1666 he began to think of the possibility of gravity reaching the moon's orbit. First of all he found the force along the normal to a circular orbit in a sphere due to a particle revolving within this sphere in the orbit mentioned. Having thus found what is generally known as "Huygens's theorem," $f=v^2/r$, he deduced "from Kepler's rule of the periodical times of the planets being in a sesquialterate proportion of their distances from the centers of their orbits" (that is to say, that the cubes of the latter distances are proportional to the squares of the periodic times), that the forces which keep the planets in their orbits must be inversely as the squares of their distances from the centers about which they revolve. The comparison of the distance fallen through by the moon in a short time with the distance it would fall through under a force inversely proportional to the square of its distance from the earth's surface was found to answer "pretty nearly." The same law of force would result from considering, as Newton did in 1675, the gravitating force as an emanation from the attracting body; for the areas of the surface of the spheres to be affected at greater and greater distances increase as the squares of their radii, since the area of the surface of a

[1] *The Monist*, Vol. XXIV, 1914, p. 198.

sphere of radius r is $4\pi r^2$, and hence the intensity of the force at any particular point on any sphere to be affected would be inversely as the square of the radius of the sphere. Further, at a later period which we have some grounds for fixing as the end of 1679 or the beginning of 1680, though it might possibly have been about two years or more before this, Newton found that under a central force varying inversely as the square of the distance from the center, a small body must revolve in an ellipse with the center of force as a focus, and with a radius drawn to that center describe areas proportional to the times. It should be noticed that the law of areas was not found in 1666, and does not seem to have been at first found for central forces in general. In this article my first purpose is to attempt a reconstruction of the Newtonian process of advancing from the not very difficult investigation of circular orbits to that of more general orbits. This seems to have occupied his thoughts in 1679 and 1680, and he had not advanced beyond this point before Halley's visit in 1684.

The following is a summary of the contents of this article. Section I: The essential point in the calculation of the central force from the orbit or (by simply reversing the calculation) the orbit from the force is the finding of the distance fallen through by the attracted body toward the center of force in any infinitesimal time. From this expression the time could obviously be eliminated by Kepler's law of areas, and this law and its generalization for *any* central force were fairly obvious deductively. A somewhat simpler proof of the generalized theorem seems to have been devised, and the theorem placed in its proper logical position as first of the series on central forces. The tract which Newton wrote in 1684 and the various editions of the *Principia* (1687, 1713, 1726) have been carefully compared; and the comparison has brought to light the remarkable fact, which does not seem to have been noticed hitherto,

that many changes were introduced into the edition of 1713 which give the expression of the central force in "intrinsic" coordinates. This expression had been given by Johann Bernoulli in 1710, and it is thus incorrect to attribute it to Newton (Sections II and IV). Section III is concerned with Newton's indirect method of finding the orbit from the force and with the mistaken assertion of Bernoulli and others that Newton's proof contains an error. Section V contains a contribution to the problem as to the way in which Newton arrived at his third Law.

I.

In the article referred to, we have seen that the essential thing to be determined in the case of a circular orbit was seen by Newton to be the distance fallen through in an infinitely small period of time. The same determination, as we shall shortly see, is also the essential thing in the strict calculation of orbits other than circular, and the determination in such a case is much more difficult since it requires a knowledge of technical mathematics that such men as Wren, Hooke, and Halley do not seem to have possessed.

Let us consider a small body made to revolve round a fixed center of force (S) attracting as the square of the distance from it, by being projected from a certain point with a certain velocity in a direction which is not along the line toward S. To form some idea of what the orbit is like, we will divide the whole time considered into a very large number of equal parts and work out, as any mathematician of the seventeenth century after Galileo naturally would, what would happen if the force toward S were to adjust itself by jerks at the end of each subdivision of time and were constant throughout each of these subdivisions. Suppose that the length of each of these subdivisions of time is so short that f, the numerical measure of the accel-

eration toward S due to the force, may be considered as constant between the positions of the body at the beginning and end of any subdivision of the time. Then, by Galileo's law, the distance fallen through toward S is $ft^2/2$, t being the length of a subdivision. Thus, as Newton showed in the sixth Proposition of the first Book of the *Principia*,[2] f is proportional to q/t^2, where q is the half versed sine which expresses the distance fallen through in the time t. Newton, at least in his later work, considered the versed sine in the middle of an evanescent arc and noticed that it points toward the center of force. Of course at that time trigonometrical functions were *lines* and not the *ratios* they became later on.

Newton's next problem was to express this infinitesimal time in terms of quantities belonging to the curve described, so that the orbit could be found from a knowledge of f, and f could be found from a knowledge of the orbit. The way to this expression would be shown by Kepler's discovery that the areas swept out by the radius vector joining a planet to the sun are proportional to the times of describing them, and thus that our t is proportional to a small triangular area whose calculation is discussed below. We will now consider whether Kepler's proposition can be deduced from general suppositions as to the motion of the small body about S.

Suppose that the body is projected at P in the direction PR under the influence of an attractive force to the fixed center S; then PR will be the tangent at the point of the orbit. If Q is a point on the orbit infinitely near P, and reached at an infinitesimal time, which we may denote by dt, after it leaves P, and QR is parallel to SP, then RQ is half the versed sine of the infinitely small arc PQV, where

[2] Any edition of the *Principia* will do. This reference is only made for shortness, as the method used by Newton to establish this result could not surely vary greatly from 1679 to 1713. It is on another question that the variations in Prop. VI throw light, as will be shown below.

V is a point on the orbit and QV is equal to PQ. Then RQ is equal to the diagonal of the parallelogram of adjacent sides PQ and QV, and this diagonal when produced passes through S. The diagonal mentioned is also proportional to the central force at Q. Since, now, RQ is parallel to PS, it is evident that the triangle SPQ, which is the area swept out by the radius vector in an infinitely small part of time, is equal in area to the triangle SPR. Proceeding in this way, if we imagine the original particle to proceed along the line PR unaffected by the force at S and therefore with unaltered velocity, so that equal spaces PR, RW, and so on, are described in equal times, the corresponding triangles formed by the actual orbit, SPQ, SQV, and so on, are all equal to one another and to the triangle SPR. Adding up all the infinitesimal triangles formed by the orbit, SP, and some other radius vector, and then going to the limit in the way familiar to those who worked with infinitesimals, we can conclude that the areas described by the radius vector increase proportionally to the time.

This is seen to be independent of the magnitude of the force directed to S, and indeed, from a logical point of view, it is the first proposition to be proved about central forces. Accordingly, though considerations on the centripetal force causing motion in a circle probably preceded the discovery of the theorem on the equable description of areas, we find the theorem as the first in the formally written out *Propositiones de Motu* of 1684[3] and as the first Proposition of the first Book of the *Principia* (Section II).[4] In both these places, however, the continuously acting central force is not a force acting constantly throughout each small interval of time, but is replaced by impulsive

[3] Rouse Ball, *Essay*, pp. 36-37.

[4] The two Corollaries printed in the first edition were omitted in the second edition, and a new set of six Corollaries added, of which the first, which is that v varies inversely as p, will be mentioned subsequently.

forces acting toward S at the end of each small interval. The latter method is rather simpler since we do not have to consider that the space through which the central force draws the particle in an infinitely small time is proportional to the square of the time. When the number of the infinitesimal triangles is increased indefinitely, this perimeter ultimately becomes a continuous curve and the instantaneous forces ultimately become a continuously acting force by which the body is continuously deflected from the tangents. Also in the latter case, the half versed sines mentioned above appear at once as diagonals to the parallelograms determined by consecutive arcs of the orbit. The second and third Propositions form the easily proved converse of the first.[5]

If now we substitute in our equation for f the value of t, or dt as it was called later, in the terms of the elementary area described in the instant dt, which is expressed by the area SPQ, which is half the product of SP, or r, and the perpendicular from Q on SP, which we may call QT, we find that f is proportional to l/r^2, where l is the limiting value of QR/QT^2 when PQ is infinitely small. This quantity l is found to depend merely on the curvature of the curve, and it can be found in any particular case. The formula expressing f as varying inversely as r^2 was given as the third Proposition of the *Propositiones de Motu* of 1684[6] and also in the sixth Proposition of the first Book of the *Principia*. The second and third Corollaries to this Proposition, which first appeared in the second edition, relate to another method of finding the area of the elementary triangle SPQ which does not involve r explicitly, but

[5] There is nothing to correspond to the second and third Propositions in Newton's tract of 1684. In the second edition of the *Principia* no very important alterations were made to these propositions, but two Corollaries were added to the second.

[6] Rouse Ball, *op. cit.*, pp. 37-38.

the area of the triangle is expressed in terms of the perpendicular p from S on PR and the arc PQ or ds.

II.

There are three things to be noticed about this second determination of the orbit. The first is that it was not given in the above-mentioned tract of 1684. The second is that in the first edition of the *Principia*, the sixth Proposition was that f is proportional to l/r^2 ("is ultimately reciprocally as the solid SP quad. $\times$ QT quad./QR"), and the Corollary simply stated that, if the orbit is given, the law of force will be found from l/r^2 in various cases in the following Propositions. In the second edition of 1713[7] the sixth Proposition was that f varies as q/t^2, and it had five Corollaries: the first gave the fact that f is proportional to l/r^2; the second, third, and fourth that f is proportional to $QR/(p.ds)^2$, and special cases; and the fifth is much as the Corollary in the first edition. The third thing is that the fact that v varies inversely as p was not explicitly noticed in the first edition of the *Principia*, but the first Corollary to the first Proposition in the second edition contains this remark. This third point is only of importance in the light of the first and second. For these reasons it seems, then, that Newton did not at first make use of the equation of the orbit which is given in terms of p and r, but only of the equation expressing that f varies directly as l and inversely as r^2. This form of the equation also seems very suggestive of the force varying inversely as r^2, and we only have to determine l and show that it does not depend on r.

In the tract of 1684, Newton determined this quantity

[7] It is not impossible that the second, third, and fourth Corollaries were added in consequence of Bernoulli's paper of 1710, in which the advantages of working with a (p, r) equation were first shown. Lord Brougham and E. J. Routh (*Analytical View of Sir Isaac Newton's Principia*, London, 1855, pp. 45-48, 52) unjustly speak as if Newton explicitly gave this formula before Bernoulli. On the importance of such equations cf. *ibid.*, pp. 63-64.

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for various curves in almost exactly the same way as he determined it in the *Principia*. In the first problem of the tract Newton solves the question of finding the law of force tending to any point in the circumference of a circle when a body revolves in the circumference.[8] This is the same as the seventh Proposition of the first Book of the first edition of the *Principia*: in the second edition this Proposition was the more general one to find the law of force to *any* given point when the body revolves in the circumference of a circle. The second problem of the tract was to find, if the body revolves in an ellipse, the law of force tending to the center of the ellipse.[9] This is the same as the tenth Proposition of the first Book of the *Principia*.[10] The third problem of the tract is: If a body revolves in an ellipse, to find the law of centripetal force tending to the focus.[11] This important Proposition is the eleventh of the first Book of the *Principia*.[12]

In this Proposition we find that the limit l referred to above is, from geometrical considerations, h^2a/b^2. When the center of force is to be at the center of the ellipse, we find that $2l$ is r^3/a^2b^2, and is therefore not independent of r. We see, then, that the centripetal force to the center of the ellipse is proportional to r.

III.

Kepler's first law is that the planets move in ellipses having the sun in one focus; so that Newton's Proposition shows that the force exerted upon them by the sun must be inversely proportional to the square of the distance. The

[8] Rouse Ball, *op. cit.*, pp. 38-39.

[9] *Ibid.*, pp. 39-40.

[10] This proof is repeated in the second edition, but in the second edition an alternative proof, which makes use of the third Corollary of Proposition VI, is also given.

[11] Rouse Ball, *op. cit.*, pp. 40-41.

[12] An alternative proof was added in the second edition.

converse of this proposition can be quite easily proved by returning backward in the argument, and this would appear to have been the way in which Newton assured himself that a body under the action of a centripetal force varying inversely as the square of the distance moves in one of the conic sections. This was stated as the first Corollary to the thirteenth Proposition of the *Principia*,[13] the twelfth and thirteenth Propositions having proved that the force tending to the focus when the body moves in a hyperbola or parabola is inversely as the square of the distance.[14]

In both the second and third problems of the tract of 1684, an essential point in the geometrical argument is a use made of the diameter of the ellipse through the center C which is conjugate to the diameter CP. To this fact apparently refers the incident described by Conduitt after Halley left Cambridge in 1684, when Newton, trying to reproduce his calculation of the path described by a body under a force varying inversely as the square of the distance, failed to obtain his former result because "in describing an ellipse coarsely with his own hand, he had drawn the two axes of the curve instead of two conjugate diameters somewhat inclined to one another. When this mistake was corrected he obtained the result which he had announced to Halley."[15] This passage was noticed particularly by De Morgan, who said that it "carries truth on the face of it."[16]

When Newton had found that a body acted upon by a centripetal force directed to a fixed point and measured by μ/r^2 describes an ellipse about that fixed point as a focus,

[13] This Proposition was practically unaltered in the second edition.

[14] The only important change made in the twelfth Proposition in the second edition of the *Principia* was the addition of an alternative proof.

[15] Rouse Ball, *op. cit.*, p. 26.

[16] *Essays on the Life and Work of Newton*, Chicago and London, 1914, p. 141.

of such a kind that μ is proportional to a/b^2, he would find that the periodic time T is given by $2\pi ab/h$, where for h is substituted the square root of $\mu b^2/a$; πab being the known expression for the area of an ellipse. From this equation we easily find that T is proportional to $a^{3/2}$ or that T^2 is proportional to a^3. This expresses Kepler's third law that the squares of the periodic times are proportional to the cubes of the major axes; and, in the fourth theorem of the tract of 1684, Newton proved this law of Kepler and added a note on the application to planetary motion. This theorem is the same as the fifteenth Proposition of the first Book of the *Principia*,[17] "that the periodic times in ellipses are in the sesquiduplicate ratio of their major axes," but to this Proposition no addition about planetary motion was made.

The fourth problem[18] of the tract of 1684 is: "Given that the centripetal force is inversely proportional to the square of the distance from the center of force, and knowing the quantity of that force, it is required to determine the ellipse which a body, projected from a given point with a given velocity, describes." This problem should be compared with the seventeenth Proposition of the first Book of the *Principia*:[19] "Supposing the centripetal force to be reciprocally proportional to the squares of the distance from the center, and that the absolute quantity of that force is known; it is required to determine the line which

[17] Unaltered in all editions.

[18] Rouse Ball, *op. cit.*, pp. 43-44.

[19] In the second edition, some words of explanation were added at the end of the demonstration, possibly in view of the criticism by Johann Bernoulli in 1710. This criticism certainly directed attention to an obscurity of Newton: the obscurity did not happen to hide an error, in view of Prop. XIII, Cor. I (to which also a fuller explanation was added in the second edition). Still, Brougham and Routh (*op. cit.*, pp. 58, 62) treat Bernoulli's contention with rather unnecessary harshness. It may be added that, except for the addition just mentioned and a scholium on motion in a conic under a force to any point, that was added to the second edition, Prop. XVII remained unchanged in all editions of the *Principia*.

a body will describe that is let go from a given place with a given velocity in the direction of a given right line." In 1684 the motion of the body P was compared with the *circular* orbit of another body revolving under the same force: in 1687 the body P was compared with a body *p* revolving in *any given* orbit. In 1684 P was assumed to describe an ellipse: in 1687 it was assumed to describe any conic section. Indeed, in the tract of 1684, the possibility of P describing a parabola or a hyperbola was only referred to at the end of this fourth problem, whereas parabolic and hyperbolic motion were proved to arise from a force varying inversely as the square of the distance in the thirteenth and twelfth Propositions respectively of the *Principia,* and, as has been mentioned, the first Corollary of the thirteenth Proposition indicates that conversely P moves in one of the conic sections about a focus from which proceeds a force of the kind mentioned. Lastly, in the tract of 1684, there was added to this fourth problem a note on cometary paths "which," according to Rouse Ball,[20] "is obscure and partly incorrect."

The rest of the tract of 1684 is devoted to a determination of the space through which a body will fall in a given time toward a center of attraction varying inversely as the square of the distance, and some determinations of the motions of projectiles in resisting mediums.

We may mention here that, among Newton's manuscripts in the Portsmouth Collection at Cambridge, there is[21] a fragment in which fluxions are employed in finding the centripetal force in an orbit. This seems to afford additional evidence that the method of fluxions was used in the discovery of the theorems afterward proved in a more Euclidean manner in the *Principia.*

[20] *Op. cit.,* p. 34.

[21] *Portsmouth Catalogue,* p. 4.

IV.

In my first article on Newton in this magazine, there is[22] an investigation of the law of force for an orbit which is not circular. It does not now seem to me very probable that the first great mathematical advance of Newton lay in satisfying himself by infinitesimal considerations that he could pass from the simple case of circular orbits to the general case. It must always be remembered that we have very little documentary evidence as to Newton's process of discovery, and that thus a reconstruction of this process can very often claim only a greater or less degree of probability. While, then, it does not seem to me likely that Newton would have been content with assuring himself in the above way that the law of the inverse square held for non-circular orbits, it seems to have been the case—as was indeed natural—that the infinitesimal elements of an orbit were considered on occasion as circular. Thus Newton worked with the versed sine of any arc.

In an infinitesimal interval, the body in all the cases which, if we are not bent on devising cases in which the curvature of the orbit becomes infinite or irregular, usually occur to us describes a circular arc about the center of curvature at the point of the curve which we consider, and Newton may possibly thus have assured himself, at least until he had strictly calculated the shape of orbits described under a given force, that the same law of force which holds for circular orbits also holds for the other orbits that occur in nature. Such an investigation may have taken place even as early as 1666, since we know that Newton was occupied in the early days of his discovery of the method of fluxions with determining the "radius of curvity" at any point of a curve.

But if Newton had found the expression v^2/ϱ for this

[22] *The Monist*, Vol. XXIV, 1914, pp. 211-213.

normal force, then, since we have at once the additional expression fp/r for this force, he would have arrived at the equation

$$f = rv^2/p\varrho.$$

Possibly also Newton found that f is proportional to q/dt^2 and that q varies as ds^2 from this last equation, as stated in Lemma XI of Section I of the first Book.

Now, by the law of the equable description of areas, $p.ds$ is proportional to dt, or, as it is usually written nowadays, $pv = h$. Substituting for v in the above equation f. we get

$$f = h^2r/p^3\varrho.$$

which is practically what Newton stated in the second and third Corollaries of his sixth Proposition in the second edition of the *Principia* (1713). This formula was first given by Johann Bernoulli in 1710; and since, as Newton announced, ds^2/q is the measure of that chord of the circle of curvature at P which is drawn from P along the line PS, we see that f is inversely proportional to this chord multiplied by p^2. We can find this chord (c) by observing that $c/2p = dr/dp$; but Newton did not indicate this formula.[23] This formula allows us to conclude that the radius of curvature is $r.dr/dp$,[24] and hence to give the simple analytical expression to the third Corollary of Newton, or the expression of Bernoulli:

$$f = h^2dp/p^3dr.$$

The first Corollary to the first Proposition of the first Book was, as I have mentioned above, added only in the second edition (1713) of the *Principia*; it is that the velocity of a body attracted toward a fixed center varies inversely as p. That this simple deduction from the law of areas was not mentioned in the first edition is perhaps an addi-

[23] Brougham and Routh (*op. cit.*, pp. 45, 46) seemed, however to state this.

[24] This expression seems to have been given first by Maclaurin in his *Treatise of Fluxions*: Maclaurin of course used the fluxional notation.

tional indication that Newton did not at first work with p and r as coordinates. If he had done so, he would, from the expression v^2/ϱ for the normal force, at once have found that f varies directly as r and inversely as $p^3\varrho$, as Bernoulli found in 1710.

In the ellipse, we can find by the analytic geometry of conic sections that ϱ is k^2/p or k^3/ab, where k is half the diameter through the center C that is conjugate to CP, and a and b are the semi-major axis and semi-minor axis. Since we also have $p = br/k$, we have, by substitution in the above expression for f, the result

$$f = h^2a/b^2r^2.$$

This section has been devoted to a formula for f for which the credit of priority seems undoubtedly to belong to Johann Bernoulli. In the same memoir Bernoulli gave a direct proof that a force inversely as the square of the distance brings about a motion satisfying Kepler's laws. However, Newton had already proved this[25] though it must be admitted that Newton's proof was neither direct nor wholly free from obscurities.

Such equations as $f = v^2/\varrho$, which seem to have been first given explicitly by Euler in 1736,[26] are in what are called "intrinsic" or "natural" coordinates. I will discuss them on another occasion.

V.

We have seen that in the Royal Society tract of 1684 the motion of a body on a fixed center of force was considered. But this case of an immovable center does not occur in nature, for we cannot be certain that the center of attraction in nature is immovable. In the case of the

[25] This fact seems to have been overlooked by Paul Stäckel in his article of 1908 on "Elementare Dynamik der Punktsysteme und starren Körper" (*Encykl. der math. Wiss.*, Vol. IV, Part 1, p. 494).

[26] *Ibid.*, p. 463.

sun, the center appears, according to Copernicus, to be stationary; but, in the case of the moon revolving round the earth, the center of attraction is not stationary but revolves in an elliptical orbit round the sun. It would seem a matter of instinctive knowledge that when we have to do with a body revolving round a very much larger one, the larger body is almost at rest. It is not a very far step to the supposition that only the center of gravity of bodies is at rest. But in the case of the solar system, we cannot say where this center of gravity is. However, it seems quite beyond doubt that Newton, from his early days, took the very natural view that what was decisive in the measure of gravity was the size and density of, or "quantity of matter in," a body. This quantity of matter would of course be a property of the body itself, and would remain the same whether or not any force of gravitation acted on it.

In a manuscript draft of 1684 which is in the Library of the University of Cambridge, England, which has been described by Rouse Ball,[27] and which I have examined, there is an additional law, expressing the consequence of the third law of motion of the *Principia*, which is of particular value in dealing with the motions of two or more mutually attracting bodies. It is that the common center of gravity of bodies does not change its state of motion or rest by the mutual actions of these bodies. This law, in the case of two bodies, is identical with the third law of motion, but in the case of three or more bodies the third law cannot be deduced from it, though it can be from the third law. In fact, if m and m' are two masses which are supposed to be alone in space, then the principle of the conservation of the motion of the center of gravity gives three equations (one for each rectangular axis) of the form

$$m(d^2x/dt^2) + m'(d^2x'/dt^2) = 0,$$

[27] *Op. cit.*, pp. 51-56.

and thus says that the accelerations are in the inverse ratio of the masses. But if there are three mass-points, we get three equations of the type of the above one, but the left-hand member of each is formed by adding three terms instead of two. Logically, we cannot deduce the mass-ratios m/m' and m'/m'' from these equations, for $a + b = 0$ does not imply that a and b are each zero; although in the present case it would seem to be a very natural thing to say that m/m' would remain the same if m'' were annihilated.

The motions of two mutually attracting bodies were dealt with in the fifty-seventh to the sixty-third Propositions of the first Book (Section XI) of the *Principia*.[28] The first of these Propositions is that two attracting bodies describe similar figures about their center of gravity and about each other. The next Proposition is that if two attracting bodies revolve about their center of gravity, then under the same forces a similar and equal orbit might be described about either one of the bodies if it were fixed. The Corollaries to this Proposition show that the results of the first, tenth, eleventh, twelfth, and thirteenth Propositions of the first Book are applicable to such motions. The sixty-first Proposition is that two bodies acted upon by their mutual attractions and not otherwise agitated or obstructed, will move as if neither attracts the other but both are attracted according to the same law of force by a third body placed in their common center of gravity.

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[28] These Propositions are practically unchanged in all three editions of the *Principia*.

NEWTON'S THEOREMS ON THE ATTRACTION OF SPHERES.

IT seems quite certain that Newton was stopped at first from pursuing the problem of the planetary motions because he very soon arrived at the idea of universal gravitation, and then thought that the calculation of the whole resultant attraction of a large piece of matter, such as the earth or the sun, is such a complicated problem that it could not at that time be solved with any approach to accuracy. Thus the description of the celestial motions which was founded on the consideration of sun and planets as points apparently could only be regarded as a very rough approximation. In 1685, however, Newton found that the problem of the attraction of a sphere on an external point admits of an unexpectedly simple solution, and it was then, under the influence of the vivid interest that would naturally be caused by the discovery that the nearly spherical planets could be treated, with a very close approximation, as mathematical points, that he returned with renewed enthusiasm to his task. We may, it seems, also conclude that the problem solved in the seventy-first Proposition of Section XII of the first Book of the *Principia*, in which the attraction of a thin spherical shell on a particle outside it was found, preceded the discovery of the seventeenth Proposition, in which the attraction of a thin spherical shell on a particle *inside* it was found. To the well-known letter to Halley of June 20, 1686, which fixes the date of the

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former discovery as 1685, we may add Newton's words in the eighth Proposition of the third Book of the *Principia*:

"After I had found that the force of gravity toward a whole planet did arise from, and was compounded of, the forces of gravity toward all its parts, and toward each part was in the inverse proportion of the squares of the distances from the part; I was yet in doubt whether that inverse duplicate proportion accurately held, or only nearly so, in the total force compounded of so many partial ones. For it might be that the proportion which accurately enough held for greater distances should be wide of the truth near the surface of the planet, where the distances of the particles are unequal and their situation dissimilar. But by the help of the seventy-fifth and the seventy-sixth Propositions of the first Book and their Corollaries, I was at last satisfied of the truth of this proposition."

The methods that Newton gave in his *Principia* for finding the attractions of spherical shells and bodies are the same in all editions. He found the attraction of a thin spherical shell of uniform density on an external point, which was the first step to determining the attraction of a solid sphere on such a point, in his seventy-first Proposition. In all that follows, S will denote the center of the shell which is of radius r, and P will denote the external point. Newton first found the attraction on P of a thin zone on the shell which is the surface cut out by an infinitely small arc of a great circle in the plane of the drawing we would naturally make, when this great circle revolves round SP as diameter and therefore perpendicularly to the plane of the drawing. Each element of the surface of this zone exerts an attraction on P which is proportional directly to the area of the element and inversely to the square of its distance from P. The first step is, then, to find the area of such a zone, which is the first step in the process, usual since the time of Archimedes, for finding the

area of the surface of a sphere. By the use of mathematical artifices which are not of a very complicated character, Newton found that the component of the attraction of the zone along SP—the total attraction of the zone on P being, by symmetry, along SP—is inversely proportional to the square of SP. The same is true of any other zone whose plane is parallel to that of the zone just considered. Therefore, by composition of ratios, the whole attraction of the spherical surface is in the same duplicate ratio.

From this we can proceed to the case of a solid sphere, by summing together various homogeneous spherical shells of center S, and we thus find that the mass of the whole set of shells is as the cube of the sphere's diameter, and the attraction on P is directly as this mass and inversely as the square of SP. This is the result of the seventy-fourth Proposition together with part of the seventy-second Proposition.

In the *Principia*, the seventieth Proposition concerns the attraction exerted by a spherical shell on a particle P within it. If we imagine an infinitely small double cone drawn so that P is the vertex and the two ends of the cone cut the sphere in small circles, the attractions of these small circles on P are opposite and proportional to the squares of their diameters while they are inversely proportional to the squares of their distances from P. Imagination of the geometrical figure made by P and any section of the shell passing through Q and the axis of the cone, and use of the thirty-fifth Proposition of Euclid's third Book show that these attractions on P are equal and opposite, and that they therefore destroy one another.

An application of the seventieth and seventy-second Propositions is contained in the seventy-third Proposition, in which is determined the attraction on a particle which is situated inside a solid sphere. If another concentric sphere is imagined which passes through the particle in question,

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the solid sphere is divided into two parts: the part outside P, by the seventieth Proposition, exerts no attraction on P; the other part, being a sphere attracting an external particle whose distance from the center is equal to the radius, exerts, by the seventy-second Proposition, a force of attraction to its center which is proportional to r^3/r^2, where r is the radius SP. The fact that the attraction on a particle within the surface of the earth is proportional to the distance from the center instead of being inversely proportional to the square of this distance was touched upon by Newton in his correspondence with Halley of 1686 on the subject of the experiment suggested to Hooke in 1679. In his letters to Hooke, Newton carelessly said that the falling body considered described a spiral path, which, as results from the fourth Section of the second Book of the *Principia*, is true for a resisting medium such as our atmosphere. But Newton, in the figure that he drew for Hooke, made this spiral continue to the center of the earth, though he seems to have acknowledged to Hooke that such a speculation was of "no use." Newton was obviously correct in supposing that Hooke did not know the law of attraction underneath the earth's surface.

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THE CONSERVATION OF VALUES IN THE UNIVERSE.

I THINK it would be true to say that in all recent philosophy there is an undertone of pessimism, if only in the sense that even its professed optimism appears compelled to struggle to maintain and justify itself. The triumphs of mind, since the Renaissance shattered the midnight of the Dark Ages—the splendid conquests of science—have produced (if we go beneath the surface of popular thinking) a strange aftermath, inasmuch as they have deposed man from the age-old throne where as παντων μετρον—"a little lower than the angels"—he ruled for ancient thought. And the Copernican revolution, even as counterbalanced by its philosophic analog, seems to have given humanity, the puny and transient offspring of eternal galaxies, its final and proper status; for which the despair of Schopenhauer, or the dogmatic of Omar,[1] appears the fittest philosophy.

So that to idealism or monism it seems a paradox equally sad as strange, that the more complex is always the more restricted, the higher is also the rarer: the simpler physical forces are interplanetary in their range, the living cell is microscopic; barbarism appears immortal, art and knowledge transient—unless we are to find consolation in the thought that "a century of Europe's worth a cycle of Cathay."

And if philosophy is thus at the best dubious, science

[1] "One thing is certain...."—Cf. also a recent expression of this standpoint in Bertrand Russell's *Mysticism and Logic*, pp. 47-48.

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seems sufficiently definite—only with an adverse verdict; for the opinion is widely held that owing to the final "degradation" of universal energy into the form of heat, all change and development without exception must ultimately cease.[2]

And certainly, if these impressions and conclusions are really well founded, it is difficult to regard intelligence or spirit as in any real sense determining the course of things, for its activity can be regarded only as in the end a failure, or, what is worse, a mockery. Life, mind, and culture become epiphenomena which revert to the dead matter from which they first arose. The universe, in spite of its marvel, would lack purpose and completion. For, we must note, it is the development of these highest values—of science, art, morality, religion—and their destruction that contradict true purpose and end—not any running down of the physical cycle in itself; for that, after all, might be the inevitable end of no matter how vast and wonderful a mechanism. But that the growth of reason and esthetic, the freedom of the moral agent in his choice between right and wrong, the tragic conflicts of national ideals—that these "shall dissolve....leave not a rack behind"—this, to reason itself, must ever remain repugnant and incomprehensible.

But I venture to think that in this respect philosophy, at least if it merit the name idealistic or monistic, may be less hesitant and more positive; and basing itself on the principle of the systematically unified nature of reality, may endeavor to prove that although higher values must necessarily be rare and restricted in range, nevertheless the universal change must inevitably result in the long run in the development of values which become continuously higher and higher without assignable limit: so that the

[2] For the consideration of the scientific aspects of this belief I may refer to *Science Progress*, No. 50, Oct., 1918, pp. 310-311.

ultimate retrogression which physical science regards as possible becomes philosophically wholly untenable; and alongside the scientific principle of the Conservation of Energy must be posited its philosophical counterpart—the Conservation of Value.

2. It is often objected, however, against philosophical arguments in general, that they set out from unanalyzed assumptions, which being shown to be ill founded, invalidate the supposed conclusion; and too often this defect must be admitted. But in postulating here the systematic unity of reality, the only principle employed is that which forms the basis of science itself, so far as this demands uniformity and law. For law can only be universal, if the reality whose nature it reveals or interprets be systematic, interconnected, or interrelated throughout its whole extent. Universal law in scientific thought must be based on universal connection in real existence. And while both are ideals, still they stand or fall together, so that to question our initial principle is at the same time to impugn the basis of all modern science.

For the progress of scientific knowledge is sporadic and fitful only to a casual view. In reality, the enunciation of every new law affects the whole body of law previously ascertained, and has its due effect in determining later discoveries; and this increasingly with each new advance,[3] so that it is becoming more and more difficult to specialize very strictly: every new law of importance throws its light on wider and wider groups of phenomena, and is applicable to more numerous cases.[4]

Therefore to assert that the unity of reality is systematic—interconnected—is also on the one hand to ex-

[3] Just as, e. g., the organism is permanently affected to some degree by every stimulus; or national law by all new legislation.

[4] The influence of the discovery of radio-activity on the theory of the constitution of matter is a recent instance; cf. again the principle of natural selection.

clude an impossible homogeneity plainly incompatible with system, and on the other to admit a practical or limited pluralism, in so far as this demands substantial heterogeneity without ultimate disconnection. For though monism is a principle which can neither be finally proved nor yet wholly dispensed with, still it does not forbid the demarcation of the whole into distinct regions with which thought can deal in separate sciences; and from this point of view philosophy must always remain *scientia scientiarum.*

Another facile objection to the "philosophy of value" is akin to that so often leveled against religious ideas—that of undue anthropomorphism. "Value," it may be urged, must in the end resolve into value for our thought,[5] and therefore its standard and sanction can never be objective and ultimate; it must (the analogous arguments in ethics will be familiar) always be unstable, varying with each new age's experience and outlook; "value" is essentially a conception at once subjective and temporal, rather than objective and eternal; it is a *Zeitgeist* rather than a *Weltgeist.* But while to this point of view must be conceded its due importance, still to insist upon it as final is to overemphasize what is merely an aspect inseparable from all our experience. For in so far as the mind's activity enters into the structure of all knowledge without any distinction whatever, this defect of subjectivity (if it be a defect) invalidates all our conceptions equally, and not only those of religion, morality, and value.[6] With these all our esthetic and scientific ideas alike are nullified,[7] and thought in brief is simply asked to commit suicide; which fatality,

[5] I should like to refer to Dr. Bosanquet's treatment of this point in *The Principle of Individuality and Value,* Lect. VIII.

[6] Of course, if it is said that these are in the end identical, I should agree; only not before the end.

[7] This argument of course is familiar; but I think that their common basis should be an equal certainty rather than dubiety.

if really inevitable, had best occur at the earliest possible moment.

3. But thought is in no predicament of this kind, even though, so slow and tortuous is its advance,[8] the idea is equally natural as deceptive. On the contrary, it surely requires little insight to recognize definite positive progress in our thinking on art, ethics, and religion; in science of course indubitably so; but science is not an activity of the mind peculiarly free from defects which are supposed to vitiate all its other manifestations. Modern thought is something more than the mere successor of previous speculation—it is also its heir, enriched by its bequests and warned by its errors, and lamentably faulty as are our moral theory and social organization, still their tone and tendency are infinitely better than the polished barbarism of pagan and medieval Europe.[9] To say, therefore, that our recognition (or even construction) of value-concepts has an inherent subjective element need not prevent our also regarding them as representing valid objective characters of ultimate reality.

We must next accord some degree at least of reality to time and change, without, however, attempting to determine their ultimate status. Whatever difficulties may attend any conception of a real which changes and endures, the world we know is certainly unintelligible apart from these attributes, even if it therefore be no more than appearance. It then appears to me that with regard to reality as thus characterized it can be shown, through the analysis of its systematic nature, that

a. All high values must be rare and restricted;

[8] "And not through Eastern windows only...."

[9] In spite of the high level attained by ethical speculation among the Greeks, their actual heartlessness, e. g., in the Peloponnesian War (probably as a result of their earlier migrations) is very remarkable, and the arguments by which it was supported strikingly similar to those employed by modern German diplomats and historians.

b. They are all possible only against a basis or background of lower values;

c. But that all change, taken as a whole, must necessarily result in the production of individuals whose value becomes increasingly higher without limit;

the last being obviously the most important.

4. Some little technicality is unavoidable, and perhaps it is best to consider a little more fully what is involved in regarding reality as being systematically at once both diverse and unified.

I have referred already to the indispensability of this conception as being the sole valid basis for universal law of whatever category—scientific, economic, or moral; and also to the practicability of reconciling within its limits the apparently opposed standpoints of monism and pluralism. These, however, are general principles, regulating the idea in its more or less formal aspect; and it seems further possible to give it a more concrete and detailed form.

Scientific classification,[10] although its classes are certainly unities, must begin by isolation and abstraction, and always retains some of the characteristics of its origin. But while classes remain merely classes, or types, it is plainly impossible to build up from them any true world; to do this we must return to those individual objects themselves from which (by abstraction) our classes were first of all formed. Perhaps an illustration may make this point clearer. The greatest novelists and dramatists differ from their less able fellows, in that, while the latter present to us what are, even at their best, only various *types* of humanity, the masters themselves create *characters*—persons—as actual and individual as living people.[11] For only thus can

[10] Really *all* classification, which, however, has reached its highest development in science.

[11] Thus Ibsen constructed in its remotest branches the life-history of his characters before writing anything of the play.

the imaginative world be given the vivid actuality of the real, and peopled with the immortals of fiction and the drama; while more commonplace effort can succeed in reproducing no more (at best) than well-drawn types of humanity at large. And philosophy may claim, though certainly in no depreciatory spirit, that some degree of analogy to this exists between its own task and that of science. For taking advantage of the indispensable preliminary classificatory work of science, philosophy seeks to return to the individual object or thing; but not, however, to this in itself simply, but rather as it must now be understood and reinterpreted in the light of scientific research upon it and its fellows. For to classify is plainly to bring a thing into some degree of relation with other things, more or less similar to itself. This is *scientific* procedure; from which philosophy differs only in carrying the same process farther, and so seeking to relate the object truly to the universe—to assign to it its due place and value within the Whole. It is true that philosophy here undertakes a task which to human intelligence is impossible in full concrete detail, for every object, even the apparently most trivial, is really unique and inexhaustible.[12] But in principle nevertheless the work is feasible and indeed obligatory; so that it remains to attempt a brief outline of some of the results of this distinctively philosophic view of the world.

Every thing or object then is, when taken in its fullest nature, in the first place unique; and secondly it is always a system, more or less complex as the case may be; i. e., in no actual instance do we ever have absolute simplicity or

[12] Cf. Tennyson's "Flower in the crannied wall...."; and contrast with Wordsworth's

"A primrose by a river's brim
A yellow primrose was to him,
And it was nothing more."

The class or type, however high its value for knowledge, is always in some degree abstract and artificial; and no one would maintain (I suppose) the actual existence of any class strictly as such.

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homogeneity and total absence of systematic structure, for this conception again is only attained by the abstraction and isolation of thought. But the term "unique" here is capable of two very different and indeed opposed meanings, according as it does, or does not, connote a total absence of connection with all other objects, for to be truly unique, an object should stand absolutely alone and severed from all else. But this of course is never the case; so that to say that every object is for philosophic thought "unique" means that, while only itself has *all* its attributes, still it maintains close connection with, and relation to, its environment. But "environment," again, may have a meaning as wide, or as narrow, as we choose to give it. Usually its meaning is comparatively restricted, because to determine an object's relation to its *immediate* environment is amply sufficient for ordinary knowledge and scientific purposes. But any limits thus given to "environment" are plainly more or less artificial, are merely matters of convenience. As knowledge increases, so does the meaning of "environment" expand, until it becomes, for knowledge at its widest, nothing less than the universe as a whole—

> "....all in all,
> "I should know what God and man is."

The ideal of philosophy, then, is to comprehend the universe as a complex of interrelated individual systems, and each individual again as connected with, and in its nature expressive of, the rest of the Whole outside of itself.

It must follow therefore that no characteristic or attribute whatever of any object (or system) is ever really negligible and purposeless; but rather every feature therein without exception, when thoroughly understood, indicates some definite connection or relation with the universe at large—i. e., with spheres of environment more and more remote without assignable limit.

But there are at the same time differences or gradations in this aspect between these attributes when taken in any given complex; the *fundamental* distinction,[13] which lies at the root of all others, being given by the extent of the environment to which any given attribute relates and connects the system in question. The distinction, e. g., between primary and secondary qualities[14] is as familiar as it is puzzling. But as a general principle, primary attributes relate a system to the widest possible environment—its weight, e. g., to the whole of the material universe—while all past changes have combined to impress upon it its figure.[15] Secondary qualities, again, maintain connection with a more restricted and specialized environment; while this is yet more the case if the tertiary (e. g., esthetic or moral) and higher qualities are considered.[16] In short (to repeat), every attribute connects its system to a sector, wider or narrower as the case may be, of the whole possible environment.[17] It is only when this principle has been grasped that we may be said to have attained a truly philosophic apprehension of any given system, as distinguished from a scientific understanding of it, which must always select and emphasize some particular environment and relations. And while all monism or idealism demands this universal connection, rational monism requires that it be thus systematically ordered and graded; while pluralism contents itself with merely limited views, which may, however, be the best in practice for given special purposes.

[13] Not, however, the only distinction, for there are always others more obvious and practical, which depend upon and are abstractions from the underlying distinction here indicated.

[14] This is the usual division, which seems, however, to lack philosophic justification; for we may if we choose add tertiary and quaternary.

[15] Its bare existence (regarding this as a real attribute) relates it to every other existent without exception.

[16] These obviously relate entities to mind; whether this holds true of all existents is, of course, a familiar problem.

[17] Cf. again the "natural rights" which every one is supposed to enjoy, with the special claims and duties imposed by a definite status in a well-ordered society, and exemplified, e. g., during the War.

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I think that this monistic or idealistic principle plainly holds true of every *static* system, whose equilibrium indeed consists essentially in this relation, at once universal and diversified, between every constituent and the whole; but the universe is dynamic,[18] and from this (it appears to me) a further fundamentally important result must logically follow.

5. Every complex system, we have seen, is, in virtue of all its attributes taken together, in connection with wider or narrower regions of the Whole. And further, each of its attributes or properties, considered separately, relates it to as wide an environmental sector as is possible for it to do—each is earmarked, as it were, for this purpose. As a result, every system is connected, in virtue of its complete intrinsic character, with an environment as general and extensive as is possible. Therefore, if we now assume any increase whatever in the system's complexity,[19] this must take the form of the development of some new characteristic, additional to those which it already possesses. But since, further, its existing properties already relate it (as has just been shown) to a range of environment as wide as is possible, the newly developed attribute can connect the system only with some sector of the external whole which is more specialized and restricted than any hitherto —simply because to all wider sections the system is related already.

But in actuality such an increasing complexity is never restricted to one, or to some few systems, but occurs universally;[19] which universality then implies further, as regards any given system, that there must be an increasing restriction and specialization on both sides—both in any

[18] Change, whatever the difficulties as to its ultimate reality, was postulated at the outset (*ante*).

[19] I endeavor to show below that such an increase is something more than a mere assumption, and an actual fact—that it is a necessary feature of the changing Whole.

given system itself, and in the whole of its environment. For every individual—every natural entity—is (in the first place) specialized in some degree—is a more or less localized element in the systematic whole. Every advance, therefore, in its complexity, especially when this occurs *pari passu* with a similar advance throughout its environment, must mean constantly higher specialization, and therefore increased localization and restriction—sensitive response to ever narrower and narrower spheres of the environment.

And thus the first result which (I think) is directly deducible from our initial principle of the systematic nature of changing reality, is that the highest and most valuable entities in the world (for these are generally the most complex and specialized)[20] are also—necessarily and inevitably—the rarest and the most restricted, both in occurrence and in range; while on the other hand, the more wide-spread, general, and diffused are any systems, the lower and simpler must be as a rule their category and value; so that what at first sight certainly appears to be a lack or a positive defect in the character of the real is found to be a direct and inevitable result of its inherent and systematic nature.

And this view again enables us to perceive the error of antagonizing—of creating antitheses between—different categories, which when thus judged by their degrees of complexity and value, are found to be relatively higher and lower. Such false contrasts are those which have been maintained between soul and body, life and matter, citizen and State, religion and morality, and others equally familiar. It must be ever futile to attempt to "reconcile" these, simply because there is no real opposition between them. Their difference, which is erroneously regarded as conflict, arises from their respective degrees of complexity and value; and they should no more be opposed to each other

[20] But the total effect may nevertheless still be esthetically simple; this arises from the harmony of the constituents, whose complexity is revealed only through analysis.

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than, e. g., the childhood and manhood of a statesman or genius.

6. This leads us to a further consideration, for not only is there no opposition between categories which thus exist at different levels, but there is rather a necessary connection between them. That this is so is indeed already to some extent recognized by modern thought, dominated as it is by the conception of evolution, whose lack in earlier times rendered possible the unfounded antagonisms just referred to. But I think philosophy may do more than merely accept the actual *fact* of evolution, which in itself only constitutes, without at all solving, this problem of the persistence of lowly forms of existence long after the development of more perfect kinds, which would seem to make their predecessors obsolete. We know that vital phenomena, e. g., occur only with a material substratum, and consciousness, whatever be the possibility of its occurrence apart from living bodies, is presented to us only in intimate dependence on physiological structure and process. But can we go beyond the mere *actuality* of these connections, to discover for them some kind of logical necessity? If we return to the fundamental principle of the nature of reality—that it is systematic—I think we can.

For if we consider the individual which, at any given moment, has attained and exhibits the highest degree of development hitherto possible, and suppose that it further acquires (from whatever causes) a fresh attribute, so as to become still more complex or "higher," this new character, as we have just seen, will relate the system to a part of its environment more restricted than any hitherto, but at the same time, *ex hypothesi,* less specialized than itself; and therefore the persistence of this new attribute—i. e., of the whole complex system possessing it—will be possible only while the "lower" environment to which it is now responsive continues in existence. Expressing this as a

general principle then, we may say that every advance in development has been possible only as responsive to, or against, a wider background or basis of systems of lower complexity. The actual extent and diversity of these again have constituted an immense area from which an infinite number of subdivisions has been demarcated, to each of which may then be developed some specialized and responsive characteristic present in a higher individual or system. Thus the philosophic rationale of entities low in the scale of values would appear to be to regard them as the indispensable stimuli and determinants of higher and more complex systems—the physical universe of the living world—the merely vital of the conscious—and our rational faculties of the moral nature.

7. The final problem to be considered is rather more complex and difficult than the two principles I have endeavored to establish. We have now to regard the universe as essentially a *changing* whole, and to inquire,—Is any general character inherent in, and necessary to, its processes of change taken in their entirety?—i. e., considered apart from the special details which science is concerned with, and viewed, in virtue of their common (though not equal) contribution to the final result, as all on a par with each other.

It is essential here to understand what is the exact purport of the question, for it is generally agreed that as a matter of fact the course of change hitherto has been from the simple to the complex—from "lower" to "higher." But while this is certainly true, still we can find in this fact itself no assurance whatever that future changes will continue to pursue this course, so as to bring about still greater complexity and higher values. Indeed, if we must accept the prevalent view of the ultimate "degradation" of all energy, the contrary would appear to be a better founded conclusion. We require, therefore, something more than a

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proof of the actual *fact* of evolutionary advance—we must seek to show its inherent and logical *necessity* in the being and nature of the world—i. e., not only that it actually *does* take place, but further that it must necessarily do so.

We may begin, then, with the principle of the universal connection between cause and effect. If we consider this relation not in any of its particular cases, but *as* universal, then we are at once led to the familiar conclusion that the real ground, or complete cause, of any given total phase in the world's development, lies in its previous condition also taken as a whole. But this result again is plainly only another aspect of the principle of the systematic—inter-related—character of reality, of the changing Whole as exhibiting an individuality which throughout is systematic but always incomplete, for at every moment it is itself the condition of its succeeding phase. Our question thus plainly takes the form: Is there between these succeeding total phases any inherently necessary universal relation? That each is throughout determined by its predecessor is certain; can we go farther and ascertain anything equally definite as to the universal mode[21] of this determination?

If we take into consideration the precise manner in which, in actuality, this universal causal determination always manifests itself, I think we may—that is, as a sequence or chain of distinguishable causes and effects always in their details (as science has shown) exactly relevant to each other. And therefore in order properly to apprehend the true nature of causal determination, it is necessary to perceive that this has always two distinct aspects, to each of which its due weight must be given. Every separate instance of cause-effect relation, that is, must be considered[22] as being essentially one constituent of

[21] I. e., as distinguished from the bare fact.

[22] I. e., from the philosophical standpoint.

the *total* causal determination of each phase of the whole by its predecessor; and to regard it, apart from this, as a phenomenon wholly separate and independent is to make of it merely a false abstraction. Certainly science must, to be successful, lay an emphasis (which is, however, philosophically illegitimate) on one of these aspects only—i. e., on each separate causal relation *as* separate; for no experiment could be attempted were the whole universe considered as determining it. But this scientific necessity is a philosophic defect, and from it there arises what is a well-recognized fault of causal explanation as generally presented—its being always infinitely retrogressive—every separate cause being only a link in an endless series, and never itself final and complete. But this defect is merely the logical result of the false isolation and narrowness of all scientific causes without exception; it is due to our losing sight of the truth that the only cause which can be truly final is nothing less than the Whole itself.

8. But the assertion that each phase of the universe is determined by its predecessor must obviously mean that every static system[23] derives its concrete character from the nature of the Whole, and in this respect itself expresses that nature; every thing owes its own particular character in the end to the nature of the Whole. The inner structure of every system being the result of all previous changes, its stability and equilibrium must obviously depend upon, and be responsive to, the sum total of its environing conditions; never for a moment is it severed from and independent of its total environment, which thus determines equally the maintenance, or the cessation, of its static equilibrium—i. e., of its persistence as a system (for science) or as an individual (for philosophy).

But science is interested, for obvious reasons, rather

[23] Which can, of course, be only relatively—never absolutely—static.

in the alteration than in the maintenance of equilibrium,[24] in change rather than in quiescence; so that it remains to consider the implication of the truth that every change is (not merely a consequence of some prior restricted change but) a response to *alteration in the total environment.* Only by taking this universal view can we avoid the futile infinite regress which the ordinary cause-effect sequence always involves.

If, then, we consider any system S,[25] we must recognize, (*a*) that it has attained its actual concrete structure as a result of all previous change; and (*b*) that while it retains this structure unaltered, the maintenance of its equilibrium is responsive to the totality of the conditions in its environment.[26] This being the case, I think it follows quite logically that when any change to which it is sensitive occurs in its environment, then, since S is *ex hypothesi* complex, its various parts must respond differentially to the single stimulus from without. We may cite as illustrations crystallization within a matrix cooling as a whole; or the effects upon a nation of a declaration of war.

But this differential response really means that there arise within S new subordinate systems which (although S was already systematic) did not exist, as such new systems, before; and this results, necessarily, in an advance in the systematization of S—in its increased specialization and heterogeneity.

[24] But the less so as science becomes more concrete; while still higher levels of culture—history, art, religion—are concerned with complex and stable systems as such.

[25] Which must always have some degree, high or low, of complexity; and also if the system remains a system in spite of change, some potentiality; this latter condition excludes from consideration all destructive change, which, however, comes indirectly within the scope of the argument.

[26] This principle tends to be left out of account, or at least fails to receive due emphasis, in two respects, (1) we regard change, rather than quiescence, as responsive to stimulus, and (2) we relate every system to too narrow and limited an environment; its real environment being nothing less than the Whole.

And such an advance, again, must be continuous without any assignable limits, for three reasons: (1) the stimuli which affect every actual system are many and varied, and each of them contributes its quota to the final compound result; but (2) what is still more important, as new systems originate within S, every further change within S is to some degree a change *outside each* of these, and so tends to induce *within* these still further systematization and complexity, *ad infinitum*; and finally (3), S itself must affect reflexly its own environing systems; what are effects within S become causes outside it; for it is itself part of some environment, so that the higher complexity induced within passes outward again and brings about correlative responsive advances in systems outside itself.[27]

Thus we appear to have proved that since the universe is systematic throughout—is interrelated, interconnected, and everywhere governed by law—therefore a continuous advance in complexity, in heterogeneity, in value, is (not only actual but) logically inevitable and necessary. All the diverse values of the universe, of whatever kind, are thus conserved and increased; all destruction really subserves reconstruction; and though this principle in itself may not be sufficient to prove indubitably that the Whole is swayed by Mind or Spirit or Personality, still it does (I think) enable philosophy to refuse to entertain pessimistic views as to the future of mankind and the world.

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[27] E. g., a state of war converts all nations other than the belligerents into neutrals with positive rights and duties.

THE STATUS OF THE CATEGORIES.

THE nature of the categories has been much obscured in the past by the efforts of Kant to meet Hume's sensationalism. Both Kant and Hume were geniuses of the first water and did in the way of analysis all, and more than all, that could rightly be expected of them by their most fervent admirers; and yet they could not accomplish the impossible.

I am compelled to criticize the tendency of this eighteenth-century movement as in many ways perverse. The story is an old one, and I shall refer only to essential points. Hume reduced reality to a manifold of passing elements which had no permanence or sameness. *In other words, he clearly saw that data are not physical things,* and yet he was so much influenced by Berkeley's idealism that he was unable to work out a theory of knowledge of a realistic sort. To a Humean, we can only offer our own critical theory of knowledge, which is neither naive realism nor a copy-theory. I presume that Hume would have admitted our possession of such categories as identity and permanence but would have denied their applicability to anything in human experience. The assumption that there was anything validly to apply them to was an illusion. But the critical realist would retort that we rightly apply them to objects of perception which we affirm, not to the contents of perception, Hume's impressions.

Kant started from the fact of knowledge and proceeded

to analyze the contents and implications of scientific knowledge. This was an excellent method of approach to the problem; but, unfortunately, Kant had not achieved an adequate epistemology and so was led to distinguish between phenomena present to, and formed by, a universal, logical mind and the inner flow of sensations in an individual mind. This logical mind supposedly forms its objects, and so knowledge finds what mind has already contributed. As is well known, Kant postulated an original manifold of sensations somehow passively given to the mind. The logical mind was thereupon regarded as a machine which actively wove these sensations into an ordered pattern. The pattern was contributed by the mind and was mental.

Kant's phenomena are really contents and not objects. Although he is an empirical realist, he is not a physical realist. Or, to put it otherwise, these phenomenal contents which he takes to be objects are constructs related to the postulated synthetic ego and dependent on it. Kant is an idealistic naive realist, that is, he does not want to drop back into psychologism with Hume, and yet he is convinced that what is given is mental. To put it frankly, he was puzzled. No one can read the *Critique of Pure Reason* without feeling that. He tries to keep the realism as against the percipient, while admitting the idealism in relation to a logical ego. It is this "objective" idealism which modern idealism takes refuge in. Unlike Hume's sensations, the Kantian phenomenon is thought of as permanent and identical. It is in this similar to the *thing* of naive realism, and yet it differs in that it is relative to a logical ego.

In accord with most critical thinkers to-day, I would disavow both Hume's atomism and Kant's logical machinery. As James Ward puts it, "Thinking is doing, and like all doing has a motive and has an end. Kant's *logical* ego functioning spontaneously out of time is but a chimera

buzzing in a vacuum and feeding on second intentions; that it is the thinnest of abstractions, he himself allows."[1]

What we must commence with is the field of the individual's experience as it is concretely given with its structure and empirical content full upon it. Genetic logic and genetic psychology can study the growth of this complex experience from humbler stages, but they find no reason to assume either a disconnected manifold or a spider-like ego, however far back they go. What they will discover is greater simplicity of structure and fewer distinctions.

Strictly speaking, epistemology is a critical science which studies the meaning and claim of knowledge at the level of adult experience in the light of what are decided to be inevitable and well-grounded distinctions. Hence, this genetic approach is not absolutely necessary to it. Yet it is confirmatory and suggestive, and enables the thinker to throw off the incubus of the old controversies. *I would not be understood to belittle the value of a keen insight into the logical development of modern philosophy.* I do not believe that any one can go far toward the solution of these problems unless he appreciates the formulations, rejections, successes, and failures of past thinkers. He must have the ability to hold past and present together in a synoptic way, and yet possess the vitality that is not overwhelmed by erudition. In other words, he must be able to put his finger upon the genuine problems and grasp the best setting for them that philosophy and science have made possible by their growth.

The individual's field of experience is, I take it, but another name for what the psychologist calls consciousness. The common thesis of critical realist and psychologist is that this changing field of experience is a structural whole which is a function of the organic individual in active rela-

[1] Ward, *Naturalism and Agnosticism*, 4th ed., p. 481. I am glad that I can agree so largely with Ward on these points.

tion with his environment which consists of inorganic things and other persons. It is *within* this organic individual as an expressive part of it that consciousness arises. Personally, I do not care whether this organic individual be called a subject, or a self, or what it is called, so long as no unempirical notions are surreptitiously introduced. I prefer to call it an organic individual or a psycho-physical organism because these terms correspond to our knowledge of it and do not preclude the intussusception of all that the terms subject or self can justly add. Let me admit that idealistic philosophy was far from wrong in its protests against associational psychology and against the *reductive* mechanistic views of biology. *It was right in its empiricism; it was wrong in its transcendentalism.* But is not this old battle a thing of the past whose fruits have been appropriated by the younger generation? The sharp contrasts of the past have given way to a deeper outlook. The time is ripe for the interpretation of this massive growth. It is my contention that evolutionary naturalism, on the metaphysical side, and critical realism, on the epistemological side, are the logical philosophical formulations of the actual *Weltanschauung* of the present.

Epistemology stresses what psychology has neglected, viz., the structural or formal side of consciousness. I presume that it puts its finger on a common weakness of past science, its neglect of pattern or organization. Psychology has been largely reductive and analytic. It may be that psychology can thus best meet the special problems in which it is interested. Nevertheless, philosophy must examine the structure and important distinctions of the individual's field of experience. These are facts as real as any to be found in biology. This descriptive empiricism, dealing with the structure of the whole of consciousness as it is concretely given rather than with the hypothetical elements into which *abstracted parts* like ideas and perceptual com-

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plexes can be analyzed, is the true foundation of epistemology.[2] Such descriptive empiricism has nothing in common with what continental thinkers call psychologism. It does what psychology has neglected to do; it enlarges psychology, if you will. And I take it that this is what modern philosophy has really accomplished. Unfortunately, the Kantian tradition with its consciousness-in-general and its neglect of the individual was often too strong for it.

This large structure of concrete consciousness is just as common to various individuals as is the structure which the biologist finds in an animal species. This commonness of structure, however, no more conflicts with mental pluralism than does the common structure of individuals of a species conflict with the numerical distinctness of the individual organisms.

Now with the addition of this descriptive enlargement of psychology, critical realism reaffirms the belief of both common sense and psychology that consciousness is a function of the organic individual in interaction with its environment. But against naive realism it holds that this environment is not apprehended. The knowledge situation is more complex than naive realism supposes. New distinctions must be added. In other words, knowledge is not conceived *as an act of awareness* of an object literally presented but *as a structural system of contents and affirmations.* Knowledge of physical existents can be only grounded information assigned to affirmed objects as revealing something about them.[3]

If the individual's field of experience is a growth which reflects—if it does not do more—the active interplay of organism and environment, we need not be surprised to find that it contains distinctions of significance. Let us

[2] Cf. *The Essentials of Philosophy,* Ch. 8.

[3] Cf. an article in the *Philosophical Review,* September, 1918. This interpretation of knowledge does not conflict with the existence of less critical views.

mention a few such distinctions which we shall later analyze.

There is, for instance, the idea of particular physical things. These things are qualified as permanent and self-identical. These are the categories which we saw puzzled Hume who could not find anything which justified their application. We know that they apply to existences which cannot be literally given but which are represented in a way by data. The origin of these categories is fairly clear to the psychologist of to-day. They are quite obviously not contributions of a logical ego but meanings which reflect concrete experiences. The individual senses his own permanence and recognizes the same content again and again which he instinctively treats as the object to which he is reacting. Thus the sensible things of naive realism are complexes of contents which move together and behave in describable ways. Their self-existence is partly modeled on that of the self and their independence means that they are things to be reckoned with. Thus these preliminary categories grow up in a natural and empirical way.

These things are perceived as in spatial relations with one another; they "act" upon one another; they change in various ways. The bodily self reacting to them is considered one of them, and its experiences of willed action and passive influence are the material for much of the first idea of these categories. It is only later that such categories are critically examined and adjusted to what is actually known about physical existents. Probably the critical refinement of the category of causality illustrates the status of the categories as well as any. Much of the feeling content has had to be elided.

How natural these distinctions built around "things" sound! How inevitable they seem to us to be! And yet they are growths whose psychological basis and stages we can in a measure trace. They are expressions of the inter-

pretative drift of consciousness under the play of organic instincts and external stimuli. The presentational content —itself a growth of sensori-motor processes—is seized, as it were, by interests focalized in the self. This presented field suggests a division into complexes which hold together, move together, and threaten or entice the self. Thus are empirical things differentiated and interrelated.

Within the field of the given, therefore, the growth of a clear pattern appears to be the function of a process in which two complementary factors work: change of position of complexes on their own initiative, and the attention to these complexes in a unitary way as a result of interests such as desire, curiosity, and fear. Because these complexes are not under the individual's direct control, they are regarded as external things and secure motor meanings. They are co-real with the self; things to be reckoned with; objects which have consequences for weal and woe. Thus this empirical structure of consciousness has an origin of the most natural sort. It rests, on the one side, upon characteristics of presentational complexes, their groupings and changes, their independence of direct control; on the other side, upon selective interests of the self.

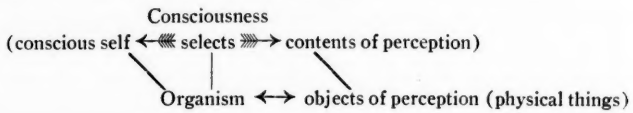
Philosophy has laid great stress upon this distinction between the self and the not-self. Yet it has failed to give it the concrete setting which is desirable.[4] It must be remembered that the not-self is a term for a plurality of things not felt to be essentially different in kind from the self. The contrast held in mind is self as a conscious center of action; and this self is from the first a bodily self. What we should stress is the fact that we have here

[4] Cf. Ward's quotation from Ferrier, *Naturalism and Agnosticism*, pp. 491-2. Ward tries to kill dualism in this fashion. But this pattern within the individual's consciousness has nothing to do with dualism; *it has to do with the indication of pluralism.* Each self feels itself confronted with many co-real things. I am inclined to think that the inability to distinguish between content and object of perception together with that abstraction, consciousness-in-general, account for much idealism.

a pattern within the consciousness of each individual. The self notes factors in their relation within consciousness and so achieves the category of thinghood. It notes sequential changes in one complex after another has moved toward it and come in "contact" with it, and soon arrives at the idea of causal interaction. The setting of these primary or common-sense categories is very concrete. The active self selects and seeks to control; it notices alterations of position; it remarks changes. It is one thing among others intensely interested in them and their possibilities.

Of course, the development of these primary categories takes time. They are growths; and yet, I think, inevitable growths. It is absurd to attempt to deduce them from an abstract understanding. They are products of the character and behavior of the sense-continuum in relation to the self as active and interpretative. Spatial and temporal order are features of the complexes which are given thinghood; and causality is the spatio-temporal interaction of these things. The framework is objective, and, if the self introjectively gives a tang and affective atmosphere to it, this subjective coloring can be withdrawn without injury to what is cognitively essential. The conscious self does not spin the categories from itself.

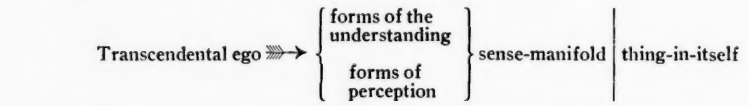
But it is time that we gave this development within experience its realistic setting. The parallelism between the object of perception and the interested organism, on the one hand, and the content of perception and the conscious self, on the other hand, needs to be borne in mind. The following diagram may suggest the situation:



The foundation of the growth of the field of experience is the interaction of organism and environment. This situa-

tion is symbolized in the diagram by the double-headed arrow. Corresponding to this active relationship, and expressive of it, is the structure of consciousness indicated above the organism. While the relation between the organism and its environment is causal, the relation between the conscious self and the contents of perception is not overtly causal in the same sense. Yet it is an undoubted fact that the conscious self is influenced by the contents of perception and that the contents of perception are selected more or less in accordance with the interests of the conscious self. Overt changes in the content of perception (an empirical thing) can be brought about only by action of the organism. This diagram illustrates the control of the contents of perception by the objects of perception. It also makes clear the basis for the conformity of data and objects. It is just because objects are organized wholes which move as one that contents of perception behave in a corresponding way in consciousness. It is just because the relations of objects are spatial and temporal that the relations of content-complexes are likewise spatial and temporal. The whole situation suggests that controlled *correspondence of order* which critical realism affirms.

Let us now contrast this analysis with Kant's schema. As nearly as I can make out the main drift of Kant's outlook—every one acknowledges that he hesitated—it is as follows:



Now it is evident that there can be no correspondence of order between the thing-in-itself and the *objects of experience* whose order is subjectively assigned. Kant shut himself into agnosticism by his very approach. Kant's schema follows the working of a machine into which raw

material is fed and there worked up. But is not the analogy completely false? We have to do with an organism *with remarkable capacities* under complex stimulation.

The need of the organism is to achieve a presentational pattern corresponding to the physical environment to which it must adapt itself. I do not think that it is farfetched to suggest that consciousness is an instrument of that adaptiveness or *Zweckmässigkeit* which characterizes all organic life. The facts indicate that the organism selectively receives stimuli in their real order and transmutes them into sense-data of a corresponding order. Association by contiguity assists the construction of this internal pattern, but the method is not entirely passive. Recognition of the same objects of perception enables the organism to test its constructions again and again. There is nothing of the pure machine in all this. It is more like the fulfilment of a set task. It is the effort of the organism for its own safety to shut out the arbitrary and purely subjective. As I put it in an article, "The brain is sympathetic with reality and, like a skilled lawyer, draws out its story and puts it into its own language."[8] It is the actual situation of the organic individual which leads to the conformity of the pattern of empirical contents with physical things. It is the need of the organism which makes it objective in its methods.

The higher levels in consciousness bear witness to the same aim. The conscious self identifies, discriminates, analyzes, compares, notes implications, traces relations, etc. What it does is to bring out the pattern in all its complexity. It does not change its material, it studies it; and it finds assistance in repetition, experimentation, a larger experience. *The activities of the mind are like ingenious tools, they further the aim of the organism.* Not by passivity but by the right sort of activity is the correct pattern

[8] *The Philosophical Review*, September, 1918.

reached. Realizing this, we stand on the shoulders of Hume and Kant. We have risen above the yearning for a passive transmission of the world into consciousness. But in so doing we have risen above both naive realism and the copy-theory. We can be realists and yet appreciate what idealism felt to be a truth, the part played by mind in knowledge.

Yet this mind is not a disembodied mind. It is not a logical ego nor a transcendental self. It is the mind of psychology and logic; it is the brain-mind sensitive to stimuli and transmuting them into presentations which arouse in the same brain-mind interests, focused in the conscious self, and operations of both an analytic and a synthetic character. This brain-mind is an instrument of the organism and it employs consciousness as a medium and means for the transmutation of the macrocosm into a correspondent microcosm. And this cognitive side of the mind is, as we all realize to-day, an organon of the affective-volitional tendencies of the organic individual. But we must not forget that what is at first almost entirely a means can become an end desired for its own sake. The desire to know is now a prime desire of civilized man.

Knowledge is, then, a function of the *capacities of the organism,* many of which are experienced in consciousness, and the *physical things* the organism selects as objects and therefore controls. These are the ultimate conditions of knowledge. And it must not be forgotten that knowledge has two distinguishable levels: (1) of contents correlated and identified with objects of perception, and so cues for conduct; and (2) propositional contents, developed upon these, yet held to be mental and distinct from the objects of perception and thought which are affirmed, and informative of them. Naive realism tries to carry through the first outlook; critical realism to explain the first and advance to the second.

Because much of objective idealism took its departure

from the Kantian tradition, it tended to think of the categories as conditions of knowledge in the sense that a non-natural mind must contribute forms and relations from itself. We see now that it confused mental capacities as instrumental to perceptual and judgmental content with a contribution of forms from a hidden ego. In contrast, the critical realist asserts a bio-psychological process.

Hegelianism tried to escape that inner dualism which Kant had adopted as a way of escape from Hume. So far, so good. But this immanent deduction of the categories from one another by the dialectical method has never been successfully carried through. The categories are actually discriminations expressive of the situation of the psycho-physical organism. They are distinctions to be *discovered* within the individual's experience in an empirical fashion. The whole ideal of *deduction* seems to me fundamentally mistaken. We must add that Hegel, no more than Kant, solved the epistemological problem. His rejection of the thing-in-itself was based upon the meaninglessness of an absolute unknowable and not upon the insight that we can possess knowledge of that which is not an element within experience. The Hegelian has always shown a timidity in facing the problem of perception as a consequence.

In its actual working, objective idealism—whether neo-Kantian or Hegelian—has discovered the categories in the object of thought instead of in the subject. Why? Because that is where they develop. A careful student of idealism writes as follows: "As a matter of fact, objective idealism has deduced the categories from the object and not from the subject. To deduce the categories from the subject, it would have been necessary to define the subject—which the idealist has consistently omitted to do. The subject has been a bystander, whose familiar presence has gradually assumed the appearance of indispensable necessity... The idealist deduces the categories from the subject *in so*

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far as conformed to the objective nature of things, and thus, in the last analysis, *from* the objective *nature of things.* The actual subject, then, does not impose necessities on nature, but yields to necessities which are dictated to it by something beyond itself."[6] In its actual implications, therefore, much of idealism is idealism only in name. It is for this reason that many religiously inclined thinkers speak of objective idealism as closely allied to naturalism. And so it is. It is a naturalism *manqué.* It is this because it never conquered its Kantian beginnings, the idea of constitutive thought, a universal mind, the object of knowledge as given in experience, etc. In short, it was reared on an inadequate epistemology. We shall see that even the pragmatists have not escaped from that magic circle called *experience.*

It is not too much to say that modern philosophy shows an unsettled view of the nature and function of mind. And yet the growth of philosophy in the light of modern biology, psychology, and logic is bringing a remedy to the vague ideas of the past which repeated such terms as relations, synthetic unity, and coherence in a semi-ecstatic way.

Pragmatism and neo-realism have supplemented one another in this advance, pragmatism showing the concrete setting of thought in the position and capacities of the human organism, while neo-realism stressed the actual operations of analysis and synthesis which are performed in consciousness. It is now seen that reflective thought follows "leads" in presented material, that reasoning is a purposive solution of problems by means of ideas and that it involves the noticing of identities and differences. Neo-realism supplements pragmatism by its intellectualism, by its stress upon order, by its anti-romanticism. It adds the iron which pragmatism has at times decidedly needed. Both movements have turned their backs on Kantianism.

[6] Perry, *Present Philosophical Tendencies,* p. 160.

The actual process of thought is being located. The individual is coming to his own. The natural is seen to include mind. Thought is not a vague creative ferment, but a highly structural process which we can empirically analyze.

But this result confirms the outlook of critical realism. The neo-realist is right in his contention that knowledge must conform to reality, but he wants an identity of idea and thing. He makes thought into a literal presence or a selective apprehension of non-mental entities. He does not see, or will not admit, that thought as a structural process ends in thoughts or ideas which conform to reality as an independent control. He thinks of consciousness as either an act of apprehension or a peculiar inclusion of objects. He would not admit the distinction between the mental content of perception and the physical object of perception. Hence he is compelled to leave the organic basis of knowledge in the capacities of the organism unexplored. Like all naive realists, he is unable to do justice to all the facts of consciousness and is puzzled to account for error and illusion.[7]

Pragmatism, on the other hand, has worked out a more empirical idea of the structure of *thought as a process.* It has removed logic from the rather stiff philosophical setting which it retained even with such a critical thinker as Bosanquet. Whether it has added much logic in the process is a question over which there might well be dispute. But pragmatism never conquered the epistemological problem which it had inherited. Instead, it felt the strength of the drift toward realism and sought more and more to be realistic in a pragmatic sort of way, that is, by ignoring patient analysis and trusting to the right postulates. While valuable as a dissolvent of absolute idealism, it would have accomplished far more, and accomplished it more quickly,

[7] Neo-realism seems to be working away from its pan-objectivism. This comes out in Spaulding's *The New Rationalism.* But critical realism will be the logical terminus of such a movement.

if it had frankly faced the questions realists propounded. Still, this must be said in its favor, that much of this realism was of the immediatist type and conflicted flatly with the pragmatist's analysis of thought as a process. But in so doing, pragmatism was compelled to develop a doctrine so conflicting with common sense as that of the change of physical things by thought. It has always seemed to me that this implication should have given them pause. But if experience is to be equated with reality without remainder, what can one do? Pragmatism drifted toward realism from its reaction against absolutism; it never conquered the right to realism.

Now critical realism is a mediate realism which seeks to do justice both to reflective thought as a process and to the claims of knowledge. In it—if I may permit myself a prophecy—both pragmatism of a chastened sort and neo-realism of a less doctrinaire type may ultimately find the satisfaction of their insights. The neo-realist must cease to take contents for objects, and the pragmatist must stop juggling with the terms of experience and admit a reference beyond the contents of experience. I am inclined to think that the root-fallacy is the same for both, the inability to distinguish between content and object.

There has been too much eristic in philosophy. For instance, both pragmatist and neo-realist must realize that words are equivocal, that there are several equally valid meanings for terms. There has been too much of a tendency to oversimplify.

It seems to me that a true empiricist can easily note that we use "thought" in four distinct ways. First, thought is a term for a reflective process; second, it is a term for data, the contentual entities which are objects of awareness; third, it is a term for the act of awareness; fourth, it is a term for an idea of an object, for the contentual thought of an object of reference, for a specific knowledge-claim.

It is too bad, perhaps, that there are all these four uses of the one term; and yet a little patience will keep them apart. I have no doubt that the use of the one common term implies the recognition that the individual mind is always involved.

Another example of an equivocal term which has always led to ambiguity is "idea." Eristic has thrived on this word. It has been a case of "either—or." But an idea is a term for an instrument within reflective thought (pragmatism) *and* a term for critically conceived data and ideata as contentual entities (use number two above). The two uses do not conflict. But is there not a third use, the mental *idea of* an affirmed existent? An object of thought may function *in the process of thought* as an instrument in the solution of a problem, and *in the cognitive attitude* as the content of the specific knowledge-claim. It is to this third use that neo-realism has not done justice because of its immediatism. I am inclined to suggest that neo-realism was led to ignore this third possibility as a result of its stress upon subsistents, be these mathematical objects, universals or ideals.

Having gained a better knowledge of the structure of consciousness and a clearer idea of mind as a condition of knowledge, we can now perceive the status of the categories. We can repeat our statement that primary knowledge is a function of the capacities of the organism under stimulation by its environment. These capacities correspond to different levels, and their operation finally results in cognitive ideas directed toward affirmed existents. *The standard elements and distinctions of this knowledge are the categories.* Thus physical things are conceived as in a spatial order and as measurable. What direction they are from one another, what distance lies between them, what their size is—all these are specific bits of knowledge that come under the spatial form as

such. Space as an abstract universal is exemplified by the specific instances. It is the common form or order. Events, or changes in physical things, happen in a peculiar order, the temporal. This order can be abstracted from its instances and studied as a universal. It is the common character of events, and, since physical things change, our knowledge about them contains this order as an internal form. Thus space and time are categories in that they are *characteristic elements* of the content of our knowledge about the physical world. They are not a peculiar logical type of being which somehow underlies the physical world. Once abstracted, however, they can become subsistential contents of awareness; they are, then, thoughts, not thoughts of.

Space and time illustrate very well this empirical doctrine of the categories. They are not physical things; they are not even peculiar elements of the physical world. They are characters of our knowledge about things. *It follows that the validity of the categories is bound up with the validity of knowledge.* They are not forms to be deduced from the self in some peculiar fashion; they are features to be discovered in objective knowledge, abstracted, and analyzed. Thus the objective idealist was right in his practical procedure. Unfortunately, the constitutive notion of the self vitiated his final interpretation. It is true, also, that he did not take some of the categories seriously enough. This depreciation is especially true of space and time. He wished to introduce the idea of value into the categories and to speak of higher categories and lower categories, degrees of reality, etc. Besides, the Kantian tradition that space and time are self-contradictory lingered in philosophy long after proper analyses of these categories had been made.

We have made it a fundamental principle that the validity of the categories is bound up with the validity of critical

knowledge about reality. But it would also be true to say that the categories are themselves instances of the most general knowledge about the physical realm. That things are in the spatial order is a knowledge-claim. And knowledge seeks to conform to that about which it is knowledge. to reflect *in its own medium* that which is reproducible about existence. But we have examined knowledge enough already to realize that it plays over existence connecting the past with the present, comparing things which have no very direct continuity, and in general probing nature. Knowledge conforms to reality in an active way much as an investigator conforms to his material. We shall see that the categories follow knowledge in this regard. They give, as it were, the structure of nature as this is projected into consciousness.

The categories appear first in experience as general characters of its pattern. This pattern is a growth which expresses a necessity to which the would-be adaptive organism is exposed. It is not a blind necessity in the mechanical sense; rather is it a necessity which is freely admitted as means to end. The mind of the organism must produce a pattern in consciousness correspondent to physical reality if it is to further the organism's safety. The result is apparent in what I have called the primary categories, viz., space, time, thinghood, and causality.

These primary categories arise at first in an uncritical form. It has taken much reflection on the part of both philosophy and the sciences to separate the objective essentials from the more subjective ingredients and so to achieve categories which are cases of general knowledge about the physical world. The history of causality is, perhaps, the most instructive example of this clarification.

Other categories arise in connection with these primary categories as knowledge is enlarged. Mass and energy as quantities, conservation as a character of these quantities

in nature, and evolution as the genetic side of many empirical substances are examples of later categories which develop and amplify the preliminary categories. These new categories are at once the general features and signs of a fuller knowledge of the world. Their history can be completely investigated since they arose in modern times. Their origin in the data of experience can readily be traced. They are discoveries and not deductions, and yet they are discoveries which require reasoning and precise reflection.

Like all universals, the categories are at once discoveries and standards. Our past experience assumed the temporal and spatial pattern and fell into things causally interacting. Whereupon science marked these features for her domain and formulated her laws in terms of such universal characters. Any thing or any event is expected to obey this framework which has been built up from a wide experience. A thing is assumed to have mass and to be in a definite position or in motion from one position to another; an event is assumed to be a function of antecedent conditions. In this sense, the categories are postulated to apply to all possible experience. They are guides for the mastery of new instances, of complex and tangled fields. Particular laws cannot be deduced beforehand, but it can be maintained that these laws will come under the categories. In this sense, they apply to all possible experience.

The question has at times been raised as to what guaranty there is that nature will recognize the categories. Kant, it will be remembered, tried to meet this difficulty by having the categories make nature. But he could give no guaranty that the ego and its forms would not change. The critical realist meets the difficulty in a different way. The categories are cases of general knowledge about nature resting upon the control by nature of the objective data of consciousness, a control actively furthered by the organism. Hence, nature itself would need to change before

they would become invalid. And while we must admit that we cannot demonstrate that nature may not abruptly change its objective order, this thought is essentially unmotived and can hardly be entertained seriously by any one who realizes the massiveness of nature and the fact that particular changes are expressions of that which changes. This hypothetical catastrophe assumes an uncaused change and so conflicts with our actual knowledge of nature. It should be noted that any gradual change in nature would be reflected in the categories.

In conclusion, attention must be called to the two general classes of categories, the epistemological and the metaphysical. Space, time, causality, organization, conservation, energy, etc., are metaphysical categories, that is, fundamental concepts characteristic of our knowledge about nature. In the following articles we shall deal chiefly with this class of categories; but, if we are to secure mastery in philosophy, we must also bear in mind those categories which concern knowledge. We must be able to get the correct interpretation for such terms as subject, object, idea, awareness, datum, phenomenon, consciousness, etc. We must be able to appreciate the structure of consciousness, its distinctions, claims, and affirmations. It is this that critical realism claims to do. It is a realism which stresses mental process, which regards the mind as an organ of the psycho-physical individual, which relinquishes the myth of a mysterious act of apprehension overleaping the boundaries of space and time, which realizes that knowledge is resident in consciousness. In this way, the epistemological categories harmonize with the metaphysical categories. Critical realism of this naturalistic type has no room for a disembodied knower.

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LOGICAL FICTIONS.

I. WHAT WE KNOW AND HOW WE KNOW IT.

I.

IT is not easy to say what it is we know and how we get to know it: to do so, we must first face other questions which in our ignorance we answer in various ways. Our chief foe is common sense that takes so much for granted. Many take the common-sense view that just as water is water, so thoughts are thoughts and knowledge knowledge. That's good enough for them; they do not feel the need for more.

But a few feel they must look more closely. In all ages, perhaps, men have tried (without much success) to analyze "knowledge" and to understand how we get it; but in recent years progress has been so considerable that any one interested in the subject now starts with the great advantage of having a large number of obstacles removed: many of the prejudices of common sense have gone forever, and, to some extent at least, the way to an answer has been pegged out.

Any one who wishes to reach a satisfactory explanation has to do some strenuous thinking for himself; but that the goal is (if it is) now almost in sight, is due to the labors of many hundreds.

But if a writer on this subject must have a strenuous time, so must the reader, for the writer may take points of view for granted that are new to the reader, and it is always difficult to follow an argument in which too much is taken

for granted. In order to prevent this as far as possible, it will be necessary to solve some of the more important difficulties offhand and dogmatically and to start with certain assumptions, leaving detailed treatment for later chapters. Just as it is not possible to do much geometry without accepting some definition of point and line, so it is not possible to get far in epistemology without *starting* with certain assumptions; it will be seen later that the only assumption we have to make is that *it is necessary to start.*

For the present we must use the common-sense phrase "to use one's senses." We cannot, of course, leave it at that, but it will do for the moment.

"Space" and "time" in the common-sense meaning are as irrelevant to our problem as a sheet of paper to the sum that is done on it. It is important to realize from the outset that common-sense ideas of time and space are merely useful habits that express in a crude way certain subtle differences in what we call "here" and "there": if used for analysis they are grossly misleading. It is, for instance, misleading to speak of the present as if it were time at all like past and future: it is only the locus of abstracts that do not exist in time. The future and the past are two aspects of the same time which is the locus of all instances of numbers (*inter alia*). The moment these instances are recognized as individuals they are localized in space.

Common sense misleads us even in the use of our senses. It is hard, as a rule, to get ourselves to look at what we see; usually we look only at what we think we see—a different thing altogether. When we look out of a window, we fancy we see things at various distances, but we don't. We see nothing but many colors and shades.

Again: most of us think that we are bound to see what we think we see. There may be cases, we admit, where we "see wrong"; but we feel that the thing was there to see all the time. It is a little hard to persuade ourselves that

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we see things only as we choose to see them. It is folly (but, practically speaking, a very necessary folly) to imagine that there is one way in which things must be seen: for if we look at a sheet of paper with a black disk in the center, it is obvious that you can see it either as a dark globe in front of the paper or as darkness behind seen through a hole in the paper. Any one will admit that there may be cases where we cannot say for certain what it is we see. We cannot always say whether a cloud is behind or in front of another. But we all find it hard to believe that the more we have "a good look all round it" and touch it and move it, the further do we get from what we see, because we are mentally constructing a complete picture which is invisible except to the mind's eye.

Even from very early years of life we cease to see things as they appear. An easy way of seeing this is to look at the floor: if we *only* look at it, it seems to do the most ridiculous things.

If, then, things can thus be seen in various ways, what is it makes us decide one way or another? The difficulty of this question will not be appreciated unless it is recognized that we can never see anything completely: what we see is a part (often an irrelevant part) which acts as a symbol to suggest the rest. There is no real difference between seeing a circular black spot either as a disk or globe on this side of the paper or as darkness beyond; seeing the sign "I" as a figure on this side or as darkness beyond; seeing "I" as a symbol of self. In all these cases, what we see is a mere fragment which suggests a great deal that is "not there." It is no exaggeration to say that all these symbols open a window on an infinity. It is the same when I recognize you or your dog or your house. In no case do I see the whole of what I mean by you, your dog, or your house. But something or other calls up what I mean by you or your dog or your house. It is quite possible I might

recognize you all by your shadows, just as I can recognize you by words that stand for you, or photos. We admit that pictures are symbols; we hesitate to admit that what our senses receive is a symbol and has been ever since early childhood.

A symbol for what? For what we put there. If we were standing outside a room and heard sounds coming from within—voices, dishes, footsteps, glasses, knives and forks—we could build up a mental picture of what might be going on. Then if we opened the door, we should not be in the least surprised to find that we had not got the picture quite right. Our eye would at once modify the picture, and we should then have a new one which we foolishly suppose to be final. For we do feel surprised now, if told that this new picture is no more likely to be final than the other. In fact, so little finality is there in it, that the longer we look the more we change it, because we notice something new each moment. Even granting that we could at any moment see such a picture in "final shape" as it "really is"—would it stay as such more than a moment? So engrossed are we with our mental construction (which is comparatively easy to fix) that we notice only with great effort that the "solid fact" which I call your house looks so different at different times of the day and from different points of view, that it would be quite unrecognizable unless treated as a symbol: we recognize your ever-changing house as easily as we recognize the word house, however carelessly or quaintly written.

It is open to any one to believe that he has "pure sensations": it is unnecessary (and certainly inadvisable) to assert that we never have pure sensations. But it is certain that the instinct to "explain" sensations works so keenly that it is very difficult to distinguish a sensation from the "explanation" that follows it. Sensations seem to bounce, and as soon as they bounce they have become

explanations. Any light, sound, or pain that cannot turn into an explanation terrifies us. And because we all explain, we think that we explain rightly—it is hard to convince ourselves that the function of an explanation is not to explain but to satisfy. Neither peasant nor scientist can explain light; both find a solution that satisfies them; if a peasant finds it easy it is because he is easily satisfied. When an apple falls from a tree, is it natural? is it weird? You may say "Of course it falls—what else should it do?"—or "gravitation, of course"—or anything else you like. It *is* weird; but for the sake of sanity, you must explain away the weirdness, so that it seems natural and you feel at home, master in your own world.

If, then, we all read the face of the world just as we read a book, seeing symbols and by their means making a mental construction which we call reality; and if we all instinctively veil as soon as possible anything mysterious or inexplicable with an explanation in order to feel masters of the situation: do we have to learn to read the external world just as we learn to read a book? Obviously; and, fortunately, when we are very young we have plenty of time.

The question remains: How do we learn to read at all? It seems such a natural, homely thing that most of us are satisfied with the "explanation": "Oh, well, we all just learn." It is extremely difficult to explain how we come to know for instance what the word *dog* stands for. We all imagine that we see hundreds of instances of *dog*. But who ever "saw" what *dog* stands for? All visible dogs are symbols: what *dog* stands for is invisible even to the mind's eye; "a dog," being only an instance, is visible only to the mind's eye; and this dog, Fido, is a group of symbols visible to the eyes.

There is a matter here which it is important to deal with: we find it hard to get rid of the idea that behind some

symbols there is what is called "the real thing." We are apt to think that we have, as it were, a scale, starting from symbols that are what may be called "exactly like," to symbols, like a printed word, which are "nothing like." And if a living dog, that we see, is a group of symbols, why are some symbols more "real" than others? It will be easier to see this difference if we first make sure of what we mean by counting. It is commonly supposed that it is possible to count things—trees, tables, coins, and so on. And not only that; we are supposed to be able to count them by merely looking at them or "ticking them off." Yet it is easy to find two tables, for instance, that have *absolutely nothing* in common, except a very-hard-to-define tableness. A table is a table because it answers to your (or some one else's) idea of a table. There can be no doubt whatever that we never count "things": we count instances of thingness. If I say I see a house, what I *see* is a group of symbols which stimulates my idea of house. What I *think* of is, (1) house, (2) a house, (3) that house. Thought No. 3 is equivalent to a proper name for what exists in space. Thought No. 2 is of what exists only in time (past or future according to your point of view): it is an instance not only of "house" but of "one." Thought No. 1 is of what does not exist in time but only in the present, being, like what "one" stands for, an organized (perhaps it would be safe to say an organic, growing) abstract.

Now, what is this thingness—this organized abstract—that we can count when we come across instances of it? A pattern. Any object seen, anything heard, touched, tasted, or smelled is distinguished by a characteristic pattern. The external world is, let us say, nature's writing. If we see written the word "Bill," it has, we say, a number of meanings. For a man whose name happens to be William—whose father and eldest son are also William—the word Bill is likely to be a very live symbol, even if it had

no other meanings. And the only reason why a "real" dog seems more real than (say) a picture, is because the real dog is a group of symbols that stands for more than merely "dog": it answers to a number of other very mysterious but quite obvious "thingnesses," like "life," "animal," "dangerous," and so on, to which the printed symbol does not answer.

We have, then, primarily an endless collection of symbols, and just as our hands can grip a handful which varies according to the matter gripped, so the mind can grip a pattern by which we prove experiences. If any experience proves to be an instance of the pattern, we can count it. By counting it, we have shifted it from an abstract present to actual time (past or future). We may then give the instance a name and place it in space.

Every pattern has, or could have, a name. The external world is not (so far as we know) full of things: for us, it is full of instances of patterns—most instances being parts of many other patterns. There are infinitely more patterns than instances—many patterns cannot even have one instance.

A pattern must not be thought of as something fixed. A pattern survives constant change by means of something very like personality: it is hard to say which is the more slippery and shifting, what the symbol "Bolshevist" stands for, or what instance will call for that description. In fact, one is tempted to say that the personality of the pattern is only a complicated relation: just as there can be no such thing as "angle" without its limits, so a pattern like Bolshevism is formed and contained, and like an angle it can have degrees. We all experience the sameness and yet the difference of a pattern: the first view may give us what is called "a totally wrong impression"—say, of Pussyfoot. But the important thing is not the "totally wrong" but the impression, which being abstract, exists outside time, that is,

permanently in the present. When we feel that the impression was totally wrong, it merely means that the pattern is like a swiftly growing crystal, or like capital at compound interest.

However difficult it may be to see clearly what a pattern is, it is easy to recognize an instance of a pattern. Who first thought of stimulating thought by symbols in imitation of nature, we do not know. Nature's symbols are essentially the same as the artificial ones we use (for instance) in language. If we read *wind* in a book, we know that we have only a symbol before us. Why is it that, when we read the symbol for the same pattern in nature, we imagine that we are doing more than reading symbols—and adding explanations?

These explanations must now be dealt with more fully and will be the subject of the following section.

II.

Before trying to reduce the number of assumptions we have made, let us repeat three important points.

1. Knowledge is founded on consciousness, which it is for physiologists to explain. We start with being aware. We start by being aware of something: before that, we were aware of nothing; since then we have never been (and can never be) aware of nothing—we can only be aware of something or something else. When we say that there is nothing in a box, we are merely stating that there is something else—not what we were thinking of. "Awareness" is, as we have said, for physiologists to explain—it seems to be similar to what is called chemical reaction or tropism. But there are various kinds of awareness: light is beautiful but it may hurt. It seems safe to say that normal human beings like light and hate being burnt. Knowledge depends not on being aware of the light or of the burn, but on connecting the two in one pattern. Like much else in nature,

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this combining process seems to be a matter of chance and habit. Once the pattern is complete we wonder how people could have failed to see the connection: we now easily connect death with lightning rather than thunder. If, then, knowledge is founded on consciousness, it is built up on connections. Common sense is so misleading because it is full of false connections. Blankets keep you warm. therefore it must be absurd to wear them in a very hot climate. When the sun shines in a clear sky the heaven is full of light, therefore on the surface of the moon the sky couldn't look black if the sun were visible. And so on. By correcting connections and complicating them in the light of experience we advance in knowledge. A sum of such connections is what is represented in a word.

2. Mere awareness, say of light or a burn, seems to be similar to what a steel pen "feels" in the presence of the magnet. There seems to be a wide range of life that survives without more than awareness: food is accepted, and either digested or rejected. Knowledge starts when it is possible to satisfy ourself without trial. And it is only possible to do this if the sensations or feelings stimulate a connection or pattern, and not merely a reaction. An instance of this would be this: I see a bird on the wing and I want to shoot it; what I shoot at (if I am to hit it) is not the bird but a "pattern" which I form by means of a most intricate set of connections.

3. We are not here concerned with the origin of this intricate set of connections. For the present it is enough to see clearly that sensations in the widest sense of the word stimulate a reaction which requires an explanation to satisfy it, or, as we might say, to explain it away. We are held up by what we cannot explain away. For instance, in a battle the whistling of bullets arrests, until we "know" it: a man falls dead—a rumbling sound—flashes—utter stillness—lights at night—all these we can ignore, only if

we can give an explanation of them. The explanation may be quite wrong, but provided that it satisfies us, we call it knowledge. If we say that a solar eclipse is due to a dragon and the explanation satisfies—that is knowledge. The moment it ceases to satisfy, we require another explanation.

We shall now be able to see that all explanations are given in terms of motion: the fundamental explanation is roughly equivalent to what we call a present participle. "Something" is essentially thought of as being capable of being distinguished or *separated* from "everything"; a thing cannot be thought of otherwise than as "*being a thing*"; no thing can be thought of as permanent in time, but it can be thought of as permanent in the "present," but only because that is a timeless abstraction of permanent change. This permanent pattern which cannot exist in time is and must be thought of as something "picked out": the moment you see a pattern, you have got something which stands out; in other words, the rest—everything else—falls away from it. The pattern of the Great Bear is got only by thinking of those stars as being on a plane of their own. Once this property of "being" is grasped, it is hard to resist the idea that all "knowledge" is due to the fact that we move and that things move. How we perceive motion is a problem with which we are not concerned. The common-sense idea is that we see it—but it seems likely that we shall not have to wait long before it is proved that, although the eye obviously supplies a large amount of the matter to be read, it is the ear that actually reads the motion.

The process can be expressed symbolically. Thus, if a stands for something perceived, the next step is represented by $a—b$, indicating that we have thought of b as moved from a. Thus, if we perceive a tree (b) it is clearly taken out of or thought of as separable from everything else (a). If we take one step further we shall be able to

show that if we *add* to our perception of the tree we are still subtracting something from the whole. If we notice the branches and call them *c*, we have clearly got as our pattern $b+c$: we have subtracted $b+c$ from *a*. Thus it is clear we can state the process either as $a-(b+c)$ or as $a-b-c$.

Common sense would say that knowledge depends on the number of terms of the series $a-b-c\ldots.-n$. The longer the better. The contrary is true. It does not even require God—any decent human brain can be trained to see that

$$a-(b+c+d\ldots.+n)=a.$$

For practical purposes that is of no use: we do not require explanations of that kind, we want explanations that will satisfy expectations. What "expectations" are, we must again ask the physiologists to explain: it is enough to suggest that "expectation" may be one (if not *the*) characteristic of "life." And the only explanations that satisfy expectations are these: if I perceive a pattern *c*, I expect that pattern to do its duty; if I come across another *c*, I not only expect it to be a *c*, but to do its duty. I may be extremely vague as to what its duty is, or I may be quite wrong; but the moment I have the pattern at all, I have some idea: the event may satisfy me or surprise me. If it satisfies me I have the pleasant "I-told-you-so" feeling; if it surprises me I am nonplused and my series $a-(b+c\ldots.)$ undergoes revision. For instance: as a child, I get the pattern "star" by seeing the night sky and a strange plump object with five or six sharp points in picture-books; at school, I have to learn by heart something that says the stars "sang for joy"; later I am taken to the theater and see other stars singing for joy; and so on. Throughout, as soon as "star" means anything, we expect every star to do its duty. For practical purposes, then, it

is evident that what we want is neither a great nor a small number of patterns; wise is the man whose patterns not only are expected to do their duty, but do it.

The *a*—*b* process is not hard to visualize. If *a* is the ocean and *b* is a drop, it is clear that *b* existed before it was separated from the ocean, but it did not exist as a drop. Likewise a thing existed, still exists, and will continue to exist, as far as we can tell, for ever or for no time in the "ocean," but it cannot exist as a thing until we recognize it as a pattern. No doubt the tiger existed in the Garden of Eden, but the tiger only became a tiger when Adam saw it and named it. What it was before that, God only knows.

Or, again, a pattern is like a pearl: it has a beginning —something which starts it—stimulates the formation. In time successive layers are added, it is the same pearl but a growing one in which the old surfaces become invisible. Even common sense will admit that my idea of a bath-bun changes as I grow older. What common sense refuses to admit is that, strictly speaking, nothing ever is quite the same as it was, because every experience is bound in some small (perhaps imperceptible) way to modify "the duty we expect."

If, then, every conceivable "thing" is thought of essentially in the form "being a thing"—much as we speak of "a saying," "a soaking," "lightning"—"thing" means a pattern, and "being" in this sense implies existence *as a pattern*. What we ordinarily call a "thing" exists in some form that is not recognized, just as a drop in the ocean is not recognizable. Of course, it is possible to think of patterns that are unsuccessful. As children we might conceive "a tree with clouds in its branches"; as such, that pattern will have its duty to perform: it is undoubtedly an explanation of what is seen. But sooner or later this explanation will cease to satisfy, and explanations that do not satisfy

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are called wrong. It is important to admit that, although it is *useful* to believe that right is right, right is really only an explanation that has not yet been found to be unsatisfying or "wrong."

Perhaps the easiest way of getting a clear idea of this "pattern" is to think of it as a diamond. "Cat" is a pattern that comes early in life, and we think we know a cat because it looks like one. We don't. We no more know a cat because it looks like one than we know a rough diamond because it looks like one. In both cases we tell by what is done, i. e., the duty we expect. Let us take only one duty: the diamond if cut will flash, the cat if stroked will purr. Other things flash and other things purr, but a diamond flashes in its own way and a cat purrs in its own way. And the interesting thing to notice is that if there were no light we could not recognize the "duty"; and if there were no surroundings or circumstances we could tell no duty. It seems that the duty is always in the circumstances and never in the pattern, just as what we see in a looking-glass is never in the looking-glass. That is why we said that what *dog* stands for is not visible even to the mind's eye. What is visible is what corresponds to the characteristic flash of the diamond—it is something characteristic in the surroundings that betrays the presence of dog. It is not hard to see that "any dog" corresponds to any facet of the diamond; "my dog" corresponds to one particular facet of a diamond that is continually being "cut" by experience.

[TO BE CONTINUED.]

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RICHARD BURTHOGGE, HIS LIFE AND HIS PLACE IN THE HISTORY OF PHILOSOPHY.*

A. THE LIFE OF RICHARD BURTHOGGE.

THERE are not many sources for the life of Richard Burthogge. The meager accounts by his biographers are based for the most part on the short sketch of his life quoted anonymously by Anthony Wood in the *Athenae Oxonienses.*

Burthogge was born in Plymouth, England.[1] The dates of his life are not definitely known, but are usually given as 1638-94.[2] As Georges Lyon[3] points out, however, the date of his death must have been later than 1694. It might be inferred from the fact that *Christianity a Revealed Mystery* was not published until 1702, that the date has been placed too early. This work, however, may have been posthumous. But the fact that *Of the Soul of the World,* a letter to Locke, is dated 1698, shows conclusively that the date of Burthogge's death must have been at least four years later than that given by his biographers.

* [The following is the Introduction to a new edition of Richard Burthogge's Philosophical Writings which will soon be issued from our press. —Ed.]

[1] Anthony Wood, *Athenae Oxonienses,* Vol. IV, p. 581. Georges Lyon, *L'idéalisme en Angleterre au XVIII. siècle,* p. 72.

[2] Leslie Stephen, *Dictionary of National Biography.* Georges Lyon, *loc. cit.* Ueberweg, *A History of Philosophy from Thales to the Present Time,* Vol. I, p. 365.

[3] *Loc. cit.*

Of Burthogge's parents we are told only that his father was a gunner.[4] And of his early life nothing is recorded but the fact that he received his early education at the Exeter Grammar School.[2] In 1654 he "became either a servitor or chorister of All-s. coll." He "took one degree in arts four years after, compleated it by determination as a member of Linc. coll."[4] He then studied medicine at the University of Leyden and in 1662 "was decorated in physic."[5] On his return to "his native country, [he] married, buried his wife, took to him a second wife who was a widow of the parish of Totness in Devonshire, on whose joynture he lives in Bowden near to that place, as he hath done above twenty years, practices physic, and by that and wiving he hath obtained a pretty foul estate. This person who always kept pace with the fanatics, temporiz'd with the papists in the reign of King James II and therefore was made a justice of peace for Devonshire, which office he kept under William III as being a favourer of fanatics. He is look'd upon as a person of considerable learning, and of no less pride and ambition."[5] The biographer is here quite evidently not free from personal feeling in sketching the facts of Burthogge's life. It is possible that he speaks with just scorn of Burthogge as one who diplomatically "kept pace with the fanatics," and at the same time "temporiz'd with the papists." Since, however, he furnishes no evidence, it is more reasonable to suppose that what he looked upon as diplomacy in Burthogge was only evidence of more advanced religious views. Religion in England in the seventeenth century was still dominated by tradition and dogma, and men of liberal religious views were rare.

In the years following his course at Leyden Burthogge was apparently finding time, aside from his professional duties, for philosophic reading and writing. Between the

[4] Anthony Wood, *loc. cit.* Cf. Georges Lyon, *loc. cit.*

[5] *Ibid.*

years 1671 and 1702 he published some eight or nine religious essays and three philosophical works. Of his philosophical writings the *Organum Vetus & Novum* appeared in 1678, the *Essay on Reason, and the Nature of Spirits* in 1694, and *Of the Soul of the World* in 1699.

B. BURTHOGGE'S PLACE IN THE HISTORY OF PHILOSOPHY.[6]

Burthogge is one of those individuals, appearing now and again in history, whose merit is unrecognized in his own day not only because his teaching is premature, but also because it is so pervaded by the dominating thought of the time that its element of originality is lost. As a philosopher Burthogge cannot be placed either with the idealists of his own time nor with those of the following century. He holds a unique place between the two. All his writings bear in some measure the stamp of the Platonic idealism of the seventeenth century. His most significant teaching, however, is more closely allied to the idealistic philosophy of the eighteenth century. But for its Lockian strain of sensationalism his theory of knowledge is essentially that of Kant.

1. *Burthogge's Relation to the Cambridge Platonists.*

The influence of the Cambridge Platonists is obtrusively evident in Burthogge's writings. His method, except in the *Organum* and in the *Essay*, is the same uncritical method of the Platonists. His theological works are full of the eloquent exhortations,[7] and long quotations from the Bible[8] and classics[9] which make the writings of Cudworth,[10]

[6] Ueberweg alone, of the writers of the history of philosophy, makes mention of Burthogge in a single short paragraph.

[7] See *Christianity a Revealed Mystery* and *A Brief Discourse concerning Perseverance in Grace.*

[8] *Of the Soul of the World*, pp. 21-24; *Christianity a Revealed Mystery*, pp. 26ff; *Causa Dei*, p. 43. The page references, throughout, are to the original editions. The writer is indebted to the Harvard University library for the use of its Burthogge texts.

[9] *Of the Soul of the World*, pp. 11, 18, 24ff; ΤΑΓΑΘΟΝ; *Causa Dei*, pp. 250f, 256, 395, et al.

More[10] and Culverwel[10] the most tedious of reading. And again, with the exception of the two works mentioned above, Burthogge's writings like those of the Platonists, are drenched with the theological views of the time.[11] And even the *Organum* and the *Essay* do not escape the religious bias of the seventeenth century.[12] But more specifically, Burthogge holds in common with the Cambridge Platonists at least two of their important tenets. His doctrine of the superiority of mind over matter is, with unimportant differences, the same as that taught by More and by Cudworth. And one of his doctrines of truth is in agreement with that of the Platonists, although he has a second teaching about truth which contradicts his own first doctrine as well as that of the Cambridge Platonists.

More and Cudworth, basing their teaching on Plato's *Timaeus*, held that not man alone, but nature as well, is dominated by a soul. They did not identify the soul of the world with God himself, but conceived it as an instrument in God's hands, made and used by him to manifest himself in the world.[13] Burthogge, on the other hand, seems to identify the "Mosaical Spirit" with the Spirit of God[14] diffused throughout the world, although he holds at the same time, that God is "Pure Mind," independent of all matter.[14] Burthogge's teaching also about the nature of the human soul is essentially that of the Platonists. More and Cudworth held that particular souls, i. e., souls of men and animals and even of plants, are "sprigs of the common soul of the world, but not the soul itself,"[15] though

[10] See Cudworth, *True Intellectual System*; More, *Antidote against Atheism*; Culverwel, *Discourse of the Light of Nature.*

[11] See *Causa Dei*; ΤΑΓΑΘΟΝ; *Christianity a Revealed Mystery.*

[12] *Organum*, Sect. 41; *Essay*, Ch. VII.

[13] Cudworth, *True Intellectual System*, edition of 1678, p. 150; More, *Antidote against Atheism*, Bk. II, Ch. II, paragr. 7.

[14] *Essay*, Ch. II, Sect. 2, p. 44.

[15] More, *Antidote against Atheism*, Appendix, Chap. II, paragr. 9; cf. *Immortality of the Soul*, Lib. III, Cap. 11-12, and Cudworth, *op. cit.*, p. 171.

it is unreasonable, Cudworth adds, to suppose that every plant and blade of grass has "a Particular Plastick Life." Similarly Burthogge call the soul "a certain Determinate Vital Energy....a certain Portion of the Spirit of the Universe Vested in a Body...."[16]

Again, in teaching that by intuition truth is attained, Burthogge is in agreement with the thought of his time. To the Platonists truth always meant religious truth, which is known, they believed, by intuition. The more completely a man can withdraw from the outer sensuous world into the realm of his own soul, the more certain is he of attaining a knowledge of truth.[17] And Burthogge likewise teaches that apart from all sensuous experience we know the form of truth, which we apply on the occasion of sense-experience, thereby determining whether it be truth or not.[18] Burthogge, however, holds an empirical theory of truth which contradicts this view. The criterion of truth, according to this second theory is based not on intuition, but rather on the objective harmony of things among themselves. Truth is not necessarily that which we "clearly and distinctly" apprehend,[19] nor that which is in accord with our faculties,[20] but that which fits in with the whole objective scheme of things.[21]

2. *Burthogge's Relation to Locke and to Kant.*

In spite of the abundant evidence in all Burthogge's writings of the influence of seventeenth-century thought, it is true that his theory of knowledge, his most important

[16] *Essay*, Ch. IV, Sect. 3, p. 150. Cf. *Of the Soul of the World*, p. 6; "....particular souls....are portions of that Spirit [Mosaical Spirit] acting in the several particular Bodies in which they are."

[17] Smith, *Discourse concerning....Divine Knowledge*, Sect. 1. Culverwel, *Discourse of the Light of Nature*, especially Chaps. IX and XI.

[18] *Organum*, Sects. 63, 69.

[19] *Ibid.*, Sects. 18, 68, 69.

[20] *Ibid.*, Sects. 7, 72.

[21] *Ibid.*, Sects. 75, 78. Cf. Sect. 16.

philosophical teaching, remains singularly free from Platonist influence. It will be noted that in the *Organum* there are scattered passages[22] in which Burthogge clings to the Platonic epistemology, holding sense to be the arch-enemy of the highest knowledge. But these occasional passages, inconsistent as they are with his usual teaching, form no integral part of Burthogge's doctrine of knowledge, which stands, untouched by Platonist influence, as a remarkable anticipation of Kant.

Far from holding that sense is a hindrance to knowledge, Burthogge teaches, like Kant, that it is one of the only two sources of knowledge. The essentials of Kant's epistemology are found in the well-known words: "Thoughts without content are empty, intuitions without concepts are blind. . . . The understanding cannot see, the senses cannot think. By their union alone can knowledge be produced."[23] And this is exactly Burthogge's teaching: "The Understanding converses not with things ordinarily but by the Intervention of the sense."[24]

Sensation, according to both Burthogge and Kant, is the passively received in knowledge, that which is given in experience:[25] ". . . . the impressions of things without upon the Sensories produce or occasion in them the Cogitations which we call Sentiments, as Colours, Sounds, Sapour &c."[26] And as objects can be perceived only through sensation, so, Burthogge teaches like Kant, they can be thought only through concepts or "notions." The mind knows nothing, he says, apart from its particular "manner of conceiving things." "The Understanding conceives not anything but under the notion of an Entity, and this either

[22] Sects. 30, 32, 34, 35, 50.

[23] *Critique of Pure Reason*, A (1st ed.), p. 51; B, p. 75.

[24] *Essay*, Ch. III, Sect. 1, p. 60.

[25] *Critique of Pure Reason*, A 51; B 75.

[26] *Organum*, Sects. 24, 74.

a Substance or an Accident; under that of a whole or a part: or of a Cause, or of an effect or the like."[27] And again Burthogge is in agreement with Kant in his most important teaching that in order to have knowledge of the object the percept and the concept must unite. Neither alone is sufficient to give complete knowledge.[28]

The parallelism between Burthogge and Kant may be carried further. Burthogge holds not only that the object of knowledge involves both the sensational and the notional factor, but, like Kant, he teaches that it has no existence independent of thought.[29] Both teach that the object of knowledge is phenomenal, not real. That the sensuous content of knowledge has no objective existence was not an absolutely new doctrine even in Burthogge's time. Locke, like Descartes, had already taught the ideality of the "secondary" sense-qualities. But that the mind itself, independent of sense-experience, actively contributes to the make-up of its own object is a doctrine which, according to the usual view, was promulgated for the first time by Kant. Yet in the light of the teaching of the *Organum* and the *Essay* it is clear that Kant's own "Copernican revolution" had an instigator at least a century older than Kant.

To hold, however, as Professor Lovejoy holds,[30] that Kant's theory was the common property of the Cambridge Platonists seems hardly justifiable even in the light of the quotations given in support of this belief. What these quotations from Cudworth and More show is rather the tenacious belief in the superiority of mind over matter, and thus in the superiority of thought (in which matter

[27] *Essay*, Ch. III, Sect. 1, p. 57. Cf. *Organum*, Sects. 14-15.

[28] *Organum*, Sects. 9-10. Cf. *Essay*, Ch. III, Sect. 1, p. 59; *Critique*, A 50. 100, 109, 116; B 74, 146.

[29] *Essay*, Ch. III, Sect. 1; *Organum*, Sects. 8-13.

[30] *Essays Philosophical and Psychological in Honor of Wm. James*, pp. 272-278.

is subservient to mind) over sensation (in which the mind is affected by matter). Nothing was more abhorrent to the Platonists than the idea that matter could in any way *assist* mind. The passage quoted from Cudworth[31] is, by his own confession, simply an outburst against the "atheistic argument" that since matter exists in its own right without need of any creative mind, our knowledge of things depends merely upon "passive receptivity." This teaching was an outrage to the Platonists merely because it belittled the mind, making it appear of so much less importance than matter, and not because it ignored the necessary conceptual element in knowledge as taught by Kant and Burthogge. "But sensible things themselves....," says Cudworth,[32] "are not known and understood either by the passion or fancy of sense, nor by anything merely foreign and adventitious, but by intelligible ideas exerted from the mind itself, that is, by something native and domestic to it." These words of the quotation, italicized by Professor Lovejoy[33] to emphasize their agreement with the Kantian teaching, seem rather to show plainly that Cudworth is simply falling back on the familiar "innate ideas" theory in order to prove to the atheist that the mind is quite capable of getting on without any assistance from matter; that it would, in fact, fare much better could it be rid of sensuous perception altogether.

Burthogge, like Kant, falls short of idealism. He could not escape the influence of the traditional dualism of the seventeenth century any more than Kant could shake off the influence of Wolff's dualistic teaching.[34] Neither Burthogge nor Kant ever denied the existence of reality external to mind. But since they find that the object of

[31] *Ibid.*, pp. 272-74.

[32] *True Intellectual System, op. cit.*, p. 731.

[33] *Essays....in Honor of Wm. James*, pp. 273f.

[34] See M. W. Calkins, *The Persistent Problems of Philosophy*, p. 236.

knowledge has no independent existence, they are forced to hold that reality, conceived as the thing independent of consciousness, is unknown. This teaching about the unknown thing is emphasized by Burthogge in both the *Organum*[35] and the *Essay on Reason*[36]. And Kant includes it not only in the section on the "Antinomies"[37] in the "Dialectic," but anticipates it in all the other divisions of the *Critique*;[38] in the chapter on "Phenomena and Noumena"[39] of the "Analytic," and in the "Æsthetic."[40]

Burthogge's teaching about the nature of the thing is essentially the same as that of Kant. The "thing" is, in the first place, unlike the "object," non-mental and wholly independent of thought.[41] In the second place, the thing really exists. The object, Burthogge teaches with Kant, is only appearance or phenomenon, without reality.[41] And finally the thing, for Burthogge as well as for Kant, is unknown.[41] Thus does Burthogge, like Kant, unquestioningly and tenaciously hold to an external reality, a reality robbed, however, of all positive character save that of existence.

There is in Burthogge no explicit proof for the existence of the thing. That there exists independent reality was not questioned in the seventeenth century. And Burthogge, like his contemporaries, takes the "thing" for granted though he suggests the argument, later used by Kant, for the existence of it. Our sensations, he says, must have a cause; we know that we ourselves do not cause them; they must therefore have an external cause.[42]

[35] Sect. 9.

[36] Ch. III, Sect. 2, pp. 71, 73.

[37] A 357, 359, 361, 368, 378.

[38] See M. W. Calkins, *op. cit.*, p. 237, footnote.

[39] A 250, 253, 258; B 300, 303.

[40] A 24, 42, 44f, 49; B 38, 59, 61f, 67.

[41] *Organum*, Sects. 9-10.

[42] *Essay*, Ch. III, Sect. 2, p. 73, cf. pp. 74f.

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Kant several times in the *Critique* implies this causal relation between the phenomenon and the thing.[43] "The understanding," he says, ".... forms the thought of an object by itself, but as transcendental only, which is cause of phenomena."[44] This doctrine is formulated even more explicitly in the *Prolegomena*: "I grant.... that there are bodies without us, that is, things which, though quite unknown to us as to what they are in themselves, we yet know by the representations which their influence on our sensibility procures us."[45] That the thing or reality is unknown seems, however, to Burthogge to require no proof. On the basis (1) of his view that external reality unquestionably exists, and (2) of his previous teaching that the object of knowledge has no independent existence, it follows inevitably that the external reality is unknown. If what is known is not external and if such external reality nevertheless exists, it follows that this reality must be unknown.[46]

The agreement of Burthogge's teaching with that of Kant is not complete. Marked as the likeness is between the two, Burthogge's epistemology seems to diverge from the Kantian at one important point. Along with his teaching that the mind independent of all external impression actively contributes part of its own object, Burthogge at the same time holds a sensationalistic doctrine. While agreeing with Kant in teaching that the notional factor is subjective in source, Burthogge seems to deny to the notion any *a priori* validity by holding, like Locke, that sense-impressions enter the mind directly, independent of *a priori* subjective conditions. "The senses," says Locke,

[43] A 252, 288; B 344.

[44] A 288, B 344.

[45] Sect. 13, Remark II. Cf. M. W. Calkins, *op. cit.*, p. 240, footnote.

[46] For Kant's arguments in defense of the view that external reality must be unknown, see *Critique*, A 128f, 244, 378.

"at first let in particular ideas, and furnish the yet empty cabinet."[47] And again: "Let us suppose the mind to be, as we say, white paper, void of all characters, without any ideas; how comes it to be furnished?....To this I answer in one word, from experience."[48] And there are passages in Burthogge which give the same sensationalistic account of the origin of our knowledge: "....the impressions of things without upon the Sensories," he says, "produce or occasion in them the Cogitations which we call Sentiments, as Colours, Sounds, Sapours &c. And Sentiments (again) impressing....the Minde and understanding, beget or occasion in it those higher Cogitations which we call Notions, Apprehensions of Reason or Ideas...."[49] This agreement of Burthogge's teaching with that of Locke, and the added fact that Burthogge's *Essay upon Reason*, dedicated[50] "To the Learned Mr. John Lock, Author of the Essay upon Humane Understanding," appeared four years after Locke's *Essay*, would suggest that Burthogge borrowed from Locke. A further consideration, however, proves the suspicion unwarranted. The *Organum* in which Burthogge's complete doctrine of knowledge is given, was published twelve years before Locke's *Essay*. Moreover, it will be noted that of Burthogge's two works the later shows less evidence of agreement with the Lockian teaching than the earlier. It is true that Burthogge insists in the *Essay*[51] as in the *Organum*,[52] that all knowledge comes through sense-experience. But the point of emphasis has been shifted in the later work. In the *Organum* Burthogge, like Locke, lays stress upon the fact that sense is the fundamental source of knowledge from which the notional is

[47] *Essay concerning Human Understanding*, Bk. I, Ch. II, par. 15.
[48] *Ibid.*, Bk. II, Ch. I, par. 2.
[49] *Organum*, Sect. 24.
[50] Preface, p. [1].
[51] Ch. III, Sect. 1, pp. 57, 59f, 62; Sect. 2, pp. 70, 74; Ch. IV, Sect. 1, p. 80, Sect. 2, p. 92; Ch. IV [VI], Sect. 2, p. 138.
[52] Sects. 9, 24, 26, 27, 32, 74[a], 92.

derived. In the *Essay*, on the other hand, Burthogge seems no longer chiefly concerned in showing that all knowledge begins with sense-experience but rather, like Kant,[53] in emphasizing the fact that since all knowledge comes through sense the object of knowledge must be phenomenal, not real.[54]

But granting that Burthogge seems to combine inconsistently a quasi-Kantian category doctrine with a Lockian sensationalism, the apparent inconsistency is not impossible of explanation. The explanation lies in two facts: in the first place, Burthogge does not include in his teaching an important part of the Kantian doctrine; and in the second place, his sensationalism is not of the thoroughgoing Lockian type. Burthogge never attributes, as Kant does, *a priori* validity to notions. While holding that notions are subjective and that they actively contribute to the make-up of the object, he never positively admits the Kantian teaching that these notions constitute the *a priori* condition under which alone sense-experience is possible. And, on the other hand, Burthogge does not hold with Locke, that sense-impressions enter the "empty cabinet" unaccompanied. Burthogge's teaching seems to be rather that, though sense-impressions are the beginning of knowledge, they never appear in the mind unaccompanied. Upon the occasion of sense-experience there are inevitably aroused in the mind certain notions. These notions are not derived from sense, but, lying dormant in the mind, are made operative upon the occasion of sense-experience. In other words, Burthogge holds neither the Kantian view that notions are the necessary condition for sense-experience, nor the Lockian view that they are merely an outgrowth from sense-experience. He seems to hold rather, that they are

[53] *Critique*, A 104.

[54] Cf. Burthogge on the advantage of knowing that the object of knowledge is phenomenal (*Essay*, Ch. III, Sect. 2, pp. 68-69) with Kant (*Critique*, 2d ed., Pref., p. xxi) and Locke (*Essay*, Bk. I, Ch. I, pars. 4-6).

the inevitable accompaniment of sense-experience, giving to it meaning.

But this reconciliation between Burthogge's sensationalism and his doctrine of subjective notions leaves still unexplained another apparent inconsistency in his teaching. The form of *apriorism* against which Burthogge argues is the same widespread "innate ideas" theory of the seventeenth century, later attacked by Locke.[55] In spite of this denial of original ideas independent of sensation ("Connatural and Ingrafted Notions; Principles designedly implanted in the Minde, to be a rule to it. . . ."[56]) Burthogge apparently admits, in the *Organum*, the validity of intuition in judgments of truth and falsity. This teaching seems to be directly opposed not only to his epistemological sensationalism, but also to his teaching that the criterion of truth is empirical. Burthogge indeed asserts both that the "form" or "notion" of truth must be known beforehand,[57] i. e., independent of sense-experience, in order that it may be applied as the test of truth when the object is presented sensuously, and (in apparent contradiction) that truth is *external* harmony, something in the object[58] which is perceived empirically only.

These two teachings about the criteria of truth certainly seem to be diametrically opposed, and yet it is possible once more to interpret Burthogge's meaning in such a way as to reconcile his intuitionism with his empiricism. If the account of Burthogge's epistemology as an intermediate form between the Kantian category doctrine and the Lockian sensationalism is correct, we need only apply this interpretation to his teaching about truth in order to explain the apparent inconsistency. In other words,

[55] *Essay concerning Human Understanding*, Bk. I.

[56] *Organum*, Sect. 73.

[57] *Ibid.*, Sects. 63, 64, 69, 74[a].

[58] *Ibid.*, Sects. 68, 69, 72, 74[a], 83, 84.

Burthogge's empirical criterion of truth can be reconciled with his intuitionism in much the same way in which his sensationalism was reconciled with his doctrine of subjective notions. Burthogge apparently means that the "form" or "notion" of truth, like all other notions is an actual part of the object, but that it is a part contributed by the mind. According to this view, although the mind alone contributes the notion of truth, it does so only on the occasion of sense-experience. The mind never even becomes aware of its possession of the "notion" of truth, until the sensuous percept provides the opportunity for the application of the notion.

If, then, it be held that Kant's chief contribution to philosophy is the theory of the possibility of *a priori* knowledge through concepts, it must be admitted that Burthogge falls short of Kantian epistemology at the crucial point. But if Kant's most important teaching is rather the denial of the possibility of categories transcending possible experience, then it must be conceded that Burthogge, in spite of his sensationalism, does anticipate the Kantian teaching. It is true that Kant's "Copernican revolution" is incomplete without both sides of his teaching. But of the two, the teaching of the *a priori* character of the categories seems less important than his teaching of their limitation of application to possible experience.

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THE CHARACTERISTICS OF MODERN PHILOSOPHY.[1]

IS the history of philosophy nothing more than a branch of natural history? Does the only reality in the object of the history of philosophy consist of the cerebral phenomena which form the basis of all intellectual activity?

The word reality has several meanings. Evidently for the physiologist, even for the psychologist, that which is real in a work of art consists of the cerebral and mental effort that realizes it; but for the universal man within each one of us, the work of art is itself a reality; it detaches itself from the brain that produced it and lives a life of its own; it elicits terror or pity, enthusiasm or disgust; it grows and dwindles away; it has its own distinctive history and destiny.

This kind of existence has to do with philosophy as it grows from age to age; it also is a poem unfolding before our eyes and interesting us in itself, quite apart from the physical and psychic conditions of which it consists.

Let us, then, consider modern philosophy by comparing it with that of the ancients. How marked the difference! It is impossible to remain insensible to the change that has taken place. To the ancients, in the golden days of the classic age, philosophy was preeminently the noblest exercise of the human intellect. Once the demands of nature satisfied and leisure won by effort, man felt awakening within himself a loftier faculty than practical activity, the

[1] [Authorized translation by Fred Rothwell.]

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faculty of knowing and contemplating the order of nature and cooperating in thought with universal reason. Such an occupation was less necessary than any other; but then, no other was so beautiful. It was the spirit taking delight in itself after falling into line with the necessities of life; it was freedom, i. e., thought liberated from physical constraint and turning of itself toward its own object. With what artless joy and *abandon* the ancient Greeks used those wonderful instruments of thought: dialectic and syllogism, which they had just discovered! They are in no hurry to reach the goal; the path leading to it is so attractive! They are not so foolish as to fix a conclusion beforehand to their reasonings, but gladly content themselves with noble anticipations and glorious risks if logic is incapable of proving more. Moreover, are they not assured that reason, that divine power within the human soul, is itself the sovereign and pattern of the universe, and consequently that science and happiness are the natural reward of a methodically planned reason? Why should philosophy impose restraint upon itself? Its sovereign sway within its own domain is beyond dispute. Religion, which appeals to the exterior man only, does not suspect it, nor is science, born beneath its wing, hostile to it. Freely it continues its task which is none other than the full blossoming of reason, the embellishing both of universal nature—in which we find it living—and of our own nature, in which we bring it to birth.

Such was ancient philosophy; modern philosophy is altogether different. This latter does not find the ground free nor can it provide itself with its own law. While the ancient wisdom was crumbling away, religion was gaining a hold on the souls of men, either satisfying or awakening moral needs almost unknown to the ancient Greeks. Henceforth man no longer contents himself with forming one in spirit with nature and contemplating that supreme

thought on which the world is founded. He regards nature as corrupt, and would like to break the bonds that bind him thereto. His will is to know a supernatural world whose regenerating influence he receives during this lifetime. In it he deserves to live forever after death. The consciousness of his sin and wretchedness besets him; while in this state he is tortured by the desire for endless perfection and happiness. Life must of necessity be the means of proceeding from hell to heaven; the Supreme Being must be a Father who has pity on his creatures. Religion alone means to answer these needs which itself has called forth or nurtured. Concerning things above, religion has received illumination that transcends reason; it is in possession both of purifying pardon and of transforming grace. It gives this world over to reason—which forms part thereof—in order to reign alone in the next, man's true home, compared with which the present world is as nothing.

Here, then, we have philosophy removed from the invisible world, dispossessed of the supreme control of the human soul. Will it, at least, remain in possession of the visible world? This was the case during the whole of the Middle Ages, when, as religion itself acknowledged, the explanation of natural phenomena was sought for in Aristotle's *Physics*. The sixteenth century, however, witnessed the birth of a rival power with principles of its own and claiming that it alone could interpret nature, and this power was science. It is not the qualitative element in things, the object of metaphysics, said the scientist, that is able to explain phenomena: they are explained as being dependent on numbers, magnitudes and mathematical properties which are clear in themselves and have no need of verification by philosophers. What we have to do is to observe phenomena, try to discover inductively their more or less constant relations to one another, and finally to

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reduce these relations or laws, which are still obscure and contingent, to mathematical formulas, disentangled of all sensible or metaphysical matter and thereby exclusive of all indetermination; by this means, man really acquires that mental representation of the universe and empire over things that is the supreme goal of his ambition on earth. Still uncertain of its independence in the days of Copernicus, Galileo, Kepler, Descartes and Newton, science, finding its material in observation and experimentation, as it found its form in mathematics, speedily became emancipated; nowadays it stands on its own feet. And whereas at first it limited its ambition to explaining astronomical or purely physical phenomena, and only in a spirit of audacity which it knew not how to justify, challenged the manifestations of life, it has gradually, by a process of continual advance, entered realms which it was forbidden to approach, and now we find no single element of reality that has any right to close the door upon it.

With these two powers, science and religion, modern philosophy came into contrast. At a time when the moral world is wholly occupied, when the power which is to seize upon the material world becomes conscious of its might, reason recovers possession of itself and claims its kingdom. In what position does it find itself when advancing this claim? During its beauteous and fertile youth, reason produces an amazing diversity of systems. This very profusion is now working against it, for truth must always be one and the same. Moreover, when examining itself, ever since the days of antiquity, reason has frequently wondered if the absolute it seeks is really accessible and if its ambition does not transcend its powers. And so it is, when feeble and distrustful of itself, that it undertakes to begin its work all over again. How much more difficult the task is now than it was in the past! No longer is freedom of thought an attribute of the human soul. Even in

such as consider themselves independent of religion, there exists the need of religion, imperiously demanding satisfaction. And none the less do those to whom science affords no satisfaction regard its findings as truths that brook no contradiction; these findings possess a type of certainty of which the ancient philosophers knew nothing. If philosophy would live, it must take account of these requirements. No longer can it quietly follow the lead of reason. Problems are set which it is compelled to meet. What is the destiny of man? What is duty and on what is it based? What is freedom? What is merit? Is the Architect of the universe likewise a Providence, assisting man and dealing with him according to his moral worth? Such questions as these, which men like Plato and Aristotle encountered only when they had to come to the end of their investigations, frequently leaving them unsolved, are now enjoined on the philosopher as essential questions which must be answered at all cost and with the utmost precision. The philosopher, too, cannot avoid inquiring what this mechanism consists of which science brings into evidence, and how far it extends. What is that experience? What are the mathematics to which we are indebted for certain truths and which, we are assured, form our only means of knowledge? When antiquity encountered such problems, it was in order to become aware of the power of reason which then had within itself the germs of science. Now, however, nature is self-sufficient. The scientist does not know whether there is reason in nature or not, and, for the philosopher, the data of science are a barrier-line sternly drawn by a foreign ruler who scorns to make known his right to do so.

That free philosophy, then, in which the sages of old took delight, is dead. To the moderns, philosophy has ceased to be a noble diversion, a kind of divine pastime; it is a task, a serious matter, the struggle of reason for its very existence. Disputing the claims of religion and sci-

ence, philosophy must give proof that it too has rights and a kingdom of its own, that it is vain for us to pretend to do without it, that it is as redoubtable to him who denies it as it is propitious to him who renders it justice, that it fears nothing from truth but rather feeds thereon and increases its power: in a word, that it lives and has power to continue alive.

Such, indeed, is the spectacle offered to us by modern philosophy. It struggles for a place between religion which commands and science which ascertains facts. At one time, examining the principles on which its opponents take their stand, it proves them ruinous unless supported by reason; at another time, it appropriates whatever is best in the doctrines and methods brought against it and turns into an instrument what seemed an obstacle; at another time it refutes and denies, and that to some purpose. Then, in self-defense, modern philosophy traces the frontiers of its kingdom: criticizing the powers of reason and fearing not to sacrifice largely in order to enjoy in safety what it retains. And now, by reason of this very criticism, thinking it has won autonomy once for all, it launches forth, and, from the depths of the infinite into which it plunges, assists at the creation of being. Here, in humbler mode, it describes and analyzes, adapting the method of physical science to the study of mental problems. In other things, it limits its ambition to classifying and organizing science. In the latter, it imagines human consciousness to be an original, special principle, as certain as any scientific or religious principle, and adequate for the foundation of the main truths which the intellectual and moral life takes for granted. In the former, it reveals and makes universal the most general principles of the sciences, in order to obtain such a view of the totality of things as is strictly in conformity with the data of experience. Thus philosophy becomes scientific with Bacon, Descartes and Leibniz, re-

ligious with Malebranche and Spinoza, descriptive with Locke, critical with Hume and Kant, moral with Kant and Fichte, transcendental with Schelling and Hegel, positive with Auguste Comte, psychological with Royer-Collard, Cousin and Maine de Biran, idealistic with Berkeley and Mill, both synthetical and experimental with Herbert Spencer. These various systems are not, as with the Greeks, the spontaneous fruits of a productive organism which is growing in every direction: each of them has for its object a more satisfactory solution of the difficulties that beset the mind of man, and arise either from religion or from science or from the relations between the two. Each of them is an attitude of reason brought face to face with its rivals: in the one case it rebels and struggles, in the other it brings the hostile powers into agreement or reconciliation with each other.

And so the history of modern philosophy is a drama of which reason is the center. The problem is to find out whether the ambition to understand, which man formerly regarded as his greatest quality, is condemned once for all, or whether human destiny henceforth consists in passive obedience to a master or in registering facts the meaning of which it is impossible to know. How can we remain aloof and indifferent when we see reason thus struggling for its very existence? How can we help gazing eagerly on the stage of life? If it is a noble spectacle to see a nation struggling for its independence, a conscience for the faith it holds, the disinherited for their means of livelihood, enthusiasts for their dreams, and passions for their satisfaction, how can it be uninteresting to see the human reason of antiquity spring into renewed life before the powers that imagined they had crushed it, collect its forces, organize attack and defense, retreat and advance in turn, drive against the enemy his own troops, and finally recreate for itself an empire wherein to reign once more in

power and glory? No, this is no idle sport; it is a real war with the souls of my fellow-beings as its battlefield, and with greater intensity than ever, in presence of this drama of moral history, there comes to my mind the poet's line: "I am a man, and nothing human is alien to me."

But is this sufficient, is modern philosophy nothing more to us than a spectacle to gaze upon? Shall we show only sympathy to the reason that insists on existing, whereas the conditions of its existence seem to have disappeared? It may suit some individuals to stand aloof from this warfare and take a curious interest in the fortunes of the fight. The human mind, however, even in these days, has not attained to this degree of detachment, and if we each one question ourselves, we find that, in this drama which we are interested in watching, the hero is another ourself; we see that we are actors as well as spectators.

Indeed, can we regard as now solved the problems which have stirred the minds of modern philosophers, and that in a sense condemnatory of philosophy? Does the human mind consider that religion or science, in so far as they claim to be adequate for man, have carried the day? Science has kept its promises. Armed with the twin weapons of observation and calculation, it brings beneath its sway every element of given reality, even such elements as appear least susceptible of being reduced to strict laws. The mind places full trust in it and abjures the right to dispute the principles on which it rests. But the more definite are the methods and results of science, the more evident it becomes that true being is beyond its scope. It decomposes and reduces, trying to find being in a simple immutable element. It thus reduces the thinking to the feeling being, the feeling to the living being, the latter to chemical substance which is supposed to consist of invisible and hypothetical atoms, themselves regarded as derivative beings

awaiting further reduction. The being after which science seeks eludes it continually; we cannot conceive of what that simple material element, to which alone objective existence must belong, is composed. Nor is this all. Speaking generally, scientific method consists in explaining the qualitative side of things by their quantitative side, the phenomena given in consciousness by the corresponding determinations of space. Space, however, considered as existing *per se*, is a thing incomprehensible; something, moreover, that science in no way claims to impose upon us. Space is inseparable from our perception of it, quantity is a quantification performed by the mind: thus, to reduce soul to matter is to reduce soul to soul itself, and science proves to be a vicious circle.

But that is of no consequence, we shall be told: science is the sum total of the knowledge it is given to us to acquire, and we must simply abandon the attempt to know that to which science cannot attain. This is all the scientist seeks, he discovers that the very thought of such problems as science is unable to solve gradually fades away from the mind.

Perhaps such a mental state, natural to one exclusively devoted to scientific investigation, might extend to all men, did the desire to know, of itself alone, fill the entire mind. But we possess in addition the power to act, to act from motives. Now, the whole of science, even if we supposed it to be complete, is incapable of supplying us with the faintest motive to action. It can tell us how, and in obedience to what motives, certain men have acted, it can ascertain that we have certain instincts or tendencies to act in some particular way; but nothing it can find will contain a reason for acting, a valid answer to the question: what advantage will it be? When I am told that the struggle for life is the fundamental law of nature, and that all our institutions, all our inventions—including those of

the intellect—and all our feelings, even those that appear most disinterested, are but effects of this law, I cannot find in such a theory any principle of action, since life for its own sake is worthless in my eyes; rather than force myself to efforts and tasks that have so vain an end in view, I would withdraw from the stage and feel inclined to cheat plans and expectations of so baffling a nature. The reason I reject pessimism and persist in my will to live is not because I am told that renunciation of life comes under the category of love of life, which love, consequently, remains the essential tendency, it is because I make an end or object for myself of that which I ascertain as fact, because I convert into morals that which is but science. Mankind has never lived by virtue of knowledge alone; were we seriously to resolve to obtain from nothing but science our reasons for acting, the effect would be gradually to slacken the springs of action and make man, after he had been reduced to a state of natural inertia, the mere sport of external influences.

Consequently, it is morally impossible for mankind not to look beyond the world as shown by science: man must have something else that will satisfy his need to know, and more especially his power to act. True, religion offers itself to meet the demand of human nature, without recourse to philosophy being necessary. And indeed, the feelings propagated by Christianity: love for the poor and lowly, respect for the human soul, the worth of moral intentions, the beauty of self-denial and confidence in the triumph of justice, are living and held in honor among men as much as ever they were. But if the Middle Ages, after appreciating Greek philosophy, were even then only willing to believe in order to understand, how much stronger is the refusal of modern generations, reared in the school of science, to adopt any dogma without sternly discussing its origin and value! And even were religion to demon-

strate what it asserts, viz., that its dogmas are supernatural revelations and that it holds promises of bliss, man would still not consider himself satisfied. For that which is only supernatural is alien to him and may crush, not convince him; while as for the happiness he is promised, he will not find it if his reason is coerced, and even if he did, he would be likely to repeat with the sages of old: better suffering in freedom than ease in slavery.

Thus, neither science alone, nor religion alone is capable of satisfying man. He wants to deal not only with astronomical and physical, physiological and psychic phenomena, but with himself as distinct from all these. He wants not only to know but also to act, to act in accordance with motives, and nothing external to himself, nothing given to him as a simple fact, can he regard as a true motive. He acts according to his idea of action only when he finds within himself the principle of his determination. And so, whether clearly conscious of it or not, he dwells in a world other than that of facts, whether natural or supernatural. Facts are but the externals of being: man would plunge into the heart of being itself. In the least of his conscious sensations, there are the confused idea of existence for itself and that of the power to act which characterize true being. That reflection on these inner depths of human nature is not found in all men, nor is indispensable to existence, is both evident and natural. Light sheds its beams, just the same, on the man who shows no curiosity as to its source. But the human mind, which reflects on everything that comes before it, cannot possibly refrain from inquiring what it is itself, when everything it studies depends on the being in which it participates. The ancients clearly saw that this exercise of reason was a noble and beautiful function, well deserving to occupy man's leisure hours: for the moderns, it is something inevitable, since both religion and science, which claimed to make philos-

ophy useless, are unable to satisfy the very needs they themselves call forth and keep alive.

Again, if the leaven of philosophy were to disappear from the human soul, one might well inquire whether scientific and religious activity would not itself be condemned. Why do we cultivate science, i. e., the disinterested knowledge of the nature of things, except for the reason that we find in it food for the spirit, something that adorns our very existence? Science, which prescribes no action of any kind, does not even invite me to cultivate science. To give myself up to it, I must find in it some pleasure worthy of being enjoyed; I must love and esteem the reason which it develops within myself, I must believe it worth while to become aware of the economy of the universe. What, too, will be the object of religion, if we are really nothing but passive instruments in the hands of an almighty force? Vainly does this force impose on us the most sublime actions. Unless we make our own the reasons of these actions by proving them to ourselves, unless we convert into free volition what at first was but an outer command, we gather no fruit from our obedience, we do not become religious at all. Religion has no grounds for existence unless it finds a man to whom to appeal, a man, i. e., a reason capable of understanding, appreciating and willing.

This struggle for existence, then, on the part of the reason, which constitutes modern philosophy, concerns us also, if we want the human ideal to be realized. Before us as before philosophers like Descartes, Spinoza, Leibniz and Kant, two paths open out: that of sense and that of spirit. It is materially permissible to take the former. In that case, there will be nothing for us but facts. History as the introduction and science as the conclusion represent the whole of the knowledge to which we can lay claim. But if we are not satisfied, in practical life, with the prin-

ciples of action that instinct, custom and science can give us, religion is there to impose commands on us in the name of an infallible and omnipotent will. We can make such a decision: if we do, the history of modern philosophy becomes relegated to the past, so far as we are concerned; it certainly retains the interest attaching to an account of anything human, but is not at all our own affair, we are watching the combat without having any voice as regards the issue.

We may also inquire what would become of mankind, if intellectual and moral life were limited to the culture of science or religion stripped of everything philosophical. Doubtless, we should have long to wait for any result. Man lives on a substratum of habits that may long survive their causes. Still, if science affords man no motive for action, and religion, of itself alone, imperfectly supplies this lack, how can we help dreading lest the exclusive sway of either the one or the other, or of both combined, gradually enfeeble the human will, and, in the end, deliver man up to pure instinct and blind force? It is action that creates human institutions, discoveries and civilizations, sciences and religions; and if one would act, one must believe oneself something. How can a man persist in willing, if he is convinced that will is an illusion, and that it is nature alone, with her mechanical forces, that produces our apparent power of initiative? Freedom is no physical phenomenon which outlives its scientific explanation. Explained by science, freedom receives its death-blow: it must disappear in time. It exists only in those who regard it as scientifically inexplicable. The idea we form of the history of philosophy thus depends on our will itself. If we cease to regard as realities both human action and the reason which is its essence, then the history of philosophy, like natural history, offers us nothing but facts to register and classify; but if we wish reason to be, to develop and

extend its empire, if we wish motives of action, thought and life to be retained by reflecting men, if we wish science itself and the moral feelings not to lose the credit we find them enjoying, then the history of philosophy, especially of modern philosophy, will be to us both a living problem and a glorious panorama; systems will no longer be abstractions, but rather clear, distinct voices whispering to the human soul; the clash of ideas will no longer be a simple relation between phenomena, but a division between ourselves and ourselves, and the historian will lend an ear both to the philosopher and to the man.

Is not this the path along which we should choose to travel?

EMILE BOUTROUX.

PARIS, FRANCE.

LEONARDO DA VINCI.

(Born 1452. Died 1519.)

THE fourth centenary of Leonardo da Vinci has been celebrated in Italy; in England the date of the death of this strange and legendary figure of the latter half of the fifteenth century, who was "still climbing after knowledge infinite," has passed almost unnoticed. Always one of the world's greatest names—for no artist of the past lent himself so readily to apotheosis—his fame has grown with the revelation of his greatness as a man of science. Other sons of the Renaissance, such as Leon Battista Alberti, were gifted with comprehensive genius, but the quality of Leonardo's endowment dwarfs their record when we sum up his activities as painter, sculptor, architect, engineer, hydraulician, anatomist, mathematician, geologist, botanist, astronomer, and geographer.

Apart from his guesses and achievements in these provinces, there is something in his personal character "super-European and silent," as Nietzsche terms it, "the characteristic of one who has seen too wide a circle of things good and evil." He behaved in such a way as to arouse the wonder of his contemporaries. "He dressed with originality and distinction, bore himself impressively. Surrounded, so to speak, by censer-swinging acolytes, he acted the part of hierophant and modern Empedocles, and was not far from being a precursor of Paracelsus."[1] He was

[1] B. Berenson, *The Study and Criticism of Italian Art*, London, 1916, p. 19.

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unconditioned, above the law, the divine artist, the worker of miracles. Yet he was a solitary in the midst of court life, in the changes and chances of his employment, and speaks of the necessity of the solitary life in no uncertain voice:

"If you are alone, you belong entirely to yourself; if you are accompanied even by one companion, you belong only half to yourself, or even less in proportion to the thoughtlessness of his conduct; and if you have more than one companion, you will fall more deeply into the same plight."[2]

We see how the strange and solitary power is impressed on his red chalk drawing in his old age of his

> "silent face,
> The index of a mind forever
> Voyaging through strange seas of thought alone."

For all his cryptic utterances and the reserve of his spirit, we must not suppose that he was in any respect a charlatan, a suspicion that clings to the name of Paracelsus. His notebooks bear witness to the intense and laborious concentration of his mind upon the problems of science, physics, or engineering he had set before himself, to his patient and manifold industry, the ordered continuity and range of his effort. His personal character, as shown in the glass of his notebooks rather than in the distorting mirror of Vasari's famous *Life,* reveals an authentic greatness.

"I wish," he says, "to work miracles; I may have fewer possessions than other men who are more tranquil and those who wish to grow rich in a day."

"As a well-spent day brings happy sleep, so life well used brings happy death."

"Our body is subject to heaven, and heaven is subject to the spirit."

[2] E. McCurdy, *Leonardo da Vinci's Notebooks,* London, 1907, p. 166.

"Where there is most power of feeling, there of martyrs is the greatest martyr."

"Intellectual passion drives out sensuality."

"To the ambitious, whom neither the boon of life nor the beauty of the world suffices to content, it comes as a penance that life with them is squandered, and that they possess neither the benefits nor the beauty of the world."

These sublimations of Leonardo's experience are expressed with a concision which renders him, like Blake, the master of significant language.

Leonardo's life is a paradox. He recommends for the artist a life spent in the seclusion of the studio; his own was spent in courts; a wanderer, from place to place—Florence, Milan, Rome, finally Amboise in France. The most laborious of men, he has left little realized and achieved work in building and the arts behind him. None of his monumental projects of construction or town-planning seem to have been carried out, most of his paintings and sculptures were never executed, others were left half finished.

He has survived his masterpieces. Modern research has shown him to have been, not the capricious and inconstant artist whose performance was always less than his promise, but the most learned of painters, studying with the intentness of a scientist the medium in which he worked, the structure of the human body, plants, trees, and rocks, in order that he should know their essence and inner reality.

His habit of scientific investigation[3] in the end drew him aside from the practice of his art; he was rapt away by the Virgilian passion *rerum cognoscere causas.* It was impossible, Isabella d'Este found, to get a picture out of him. She had applied to a friar of the Carmelite Order

[3] According to Sabba da Castiglione, "when he ought to have worked at painting, in which he would without doubt have proved a new Apelles, he gave himself up entirely to geometry, architecture, and anatomy." *Ricordi,* Venice, 1565, 115, v.

whom she knew, to know what manner of life the master was leading, and the answer was returned that he was "entirely wrapped up in geometry, and has no patience for painting." The whole world of knowledge was his province. In reading his notebooks there is at first a feeling of disappointment at the meagerness of the scientific result, but this is counterbalanced by the realization that he is the first of the moderns in his belief in experimental methods, his distrust for mere authority in science as in the arts he practised. "Whoever in discussion," he writes, "adduces authority, uses not intellect, but rather memory."[4] He has been loosely said to have been the forerunner of Bacon, Watt, Newton and Harvey, but it cannot be maintained that he anticipated their discoveries in any definite sense. Though he set down in unusually large letters "the sun does not move,"[5] and surmised that the earth was a star "much like the moon," and knew that blood moved,[6] and so forth, his actual achievements were in the invention of certain ingenious devices, such as the diving-bell and the lifebelt, and in the employment of a definitely scientific method, as in his discovery of the significance of fossils found in the mountain ridges of Lombardy as showing the waters at one time covered the earth.

"If you should say that the shells which are visible at the present time within the borders of Italy, far away from the sea at great heights, are due to the Flood having deposited them there, I reply that, granting this Flood to have risen seven cubits above the highest mountain....those shells which always inhabit near the shores of the sea

[4] "Those who study only the authorities and not the works of nature are in art the grandsons and not the sons of nature, which is the supreme guide of good authorities." *Codice Atlantico*, 141, v. b.

[5] J. P. Richter, *Scritti letterari di Leonardo da Vinci*, London, 1883, Vol. II, p. 152.

[6] "The heart is a muscle of great strength, much stronger than the other muscles....The blood which returns when the heart opens again is not the same as that which closes the valves." Richter, *op. cit.*, Vol. II, p. 132.

ought to be found lying on the mountain side, and not at so short a distance above their bases, and all at the same level, layer upon layer. Should you say that the nature of these shells is to keep near the edge of the sea, and that as the sea rose in height the shells left their former place and followed the rising waters to their highest level: —to this I reply that the cockle is incapable of more rapid movement than a snail out of water, or is even somewhat slower, since it does not swim, but makes a furrow in the sand, and supporting itself by means of the sides of this furrow it will travel between three and four braccia a day; and therefore with such a motion as this it could not have traveled from the Adriatic Sea as far as Monferrato in Lombardy, a distance of two hundred and fifty miles, in forty days....

"If you should say that the shells were empty and dead when carried by the waves, I reply that where the dead ones went the living were not far distant, and on these mountains are found all living ones, for they are known by the shells being in pairs, and by their being in a row without any dead....where the valleys have never been covered by the salt waters of the sea, there the shells are never found. ....Such things are far more ancient than letters, it is not to be wondered at if in our days there exists no record of how the aforesaid seas extended over so many countries. ....But sufficient for us is the testimony of things produced in the salt waters, and now found again in the high mountains far from the seas."[7]

His science was, in the main, applied science, as might be expected from the realistic cast of his mind. He seems to have seen every problem as, in a sense, a problem of engineering. As Mr. Havelock Ellis writes: "All nature was a dynamic process of forces beautifully effecting work,

[7] Quoted and translated in Mr. E. McCurdy's invaluable *Leonardo da Vinci's Notebooks*, London, 1907, pp. 106-109.

and it is this as it were instinctive vision of the world as a whole which seems to give Leonardo that marvelous flair for detecting vital mechanism in every field."

His studies in various provinces of natural science can hardly be touched on; some of the notes on geological, physical, botanical, and physiological subjects have been collected and interpreted in a historical light by G. B. de Toni, Edmondo Solmi, O. Werner,[8] and others, but a great part still await full scientific and historical analysis.

His manuscripts contain allusions to his mathematical studies, and in the "Philosophical Maxims" he maintains "there is no certainty in sciences where one of the mathematical sciences cannot be applied, or which are not in relation with mathematics."[9]

In astronomy, he, like his contemporaries, accepted the Ptolemaic theory of the earth as fixed, with the sun and moon revolving round it, and so represents it in a diagram. But he has also recorded, in letters which mark its importance in his mind, his intuition that the sun does not move. He points out the universality of gravitation, not only in the earth, but even in the moon,[10] and asserts that the earth is not the center of the solar system "nor yet in the central point of the universe, but in the midst of its elements by which it is accompanied, and to a person standing on the moon our earth would appear with the elements of water, and so fulfil the same function as the moon does for us."

He studied the action of heat, optics, acoustics, magnetism. He anticipated Pascal in noting that any liquid in communicating vessels, however different in form, remained on the same level. He touched on the resistance,

[8] G. B. de Toni, *Frammenti Vinciani*, Parti I-VI; E. Solmi, *Nuovi Studi sulla filosofia naturale di Leonardo da Vinci*; O. Werner, *Zur Physik Leonardo da Vincis*, Berlin, 1913.

[9] Quoted in J. P. Richter, *Scritti letterari di Leonardo da Vinci*, London, 1883, Vol. II, p. 289.

[10] Richter, *op. cit.*, Vol. II, p. 136.

condensation, and weight of air, on reflex action, embryology, and botany.

Leonardo da Vinci's anatomical researches were without influence and remained for long unnoticed. The anatomical sketches give some hint of what the projected treatise of Della Torre might have been, but as the project was never realized, the medical schools had to wait for yet another generation before the subject was placed on a sound basis by Vesalius.

He was "the best anatomist at that time in the world," in the words of the great surgeon of Georgian days, William Hunter, who saw his anatomical drawings in the King's Library, and was astonished to see Leonardo revealed in those then unknown studies as a "general and deep student, the first man we know of who introduced the practice of making anatomical drawings."[11] Marc Antonio della Torre, who held the chair of anatomy at the University of Padua, was his friend, and Vasari records that the anatomist was "wonderfully assisted by the mind, work, hand, of Leonardo, who made a book, drawn in red chalk, and annotated with the pen, of the subjects he dissected with his own hand." Many of the anatomical studies are still unsurpassed, combining scientific clearness with artistic beauty. Professor Holl[12] points out as examples of Leonardo's exact observation, his representation of the curvature of the pelvis, and its position in the body, and the resultant curvature of the spine, and of the thorax with the proper inclination of the ribs and division of the breast-bone, observations only known to the world of science after Nägele's researches. Leonardo's researches were made at a time when the Church taught the sacred-

[11] *Two Introductory Letters,* London, 1784, pp. 37-39.

[12] M. Holl, *Die Anatomie des Leonardo da Vinci.*

ness of the human corpse, and was ready to punish as sacrilege the use of the scalpel.[13]

What was his attitude to the Church which would have stayed his hand? He may have been clearly disdainful of the established religion, as he was clearly disdainful of the frailties and practices of the priesthood; or again he may have regarded the faith of his age "with imaginative acquiescence, if no more."[14] In his will, made when his end was near, he provided for masses to be said and candles to be offered in three different churches of Amboise; while Vasari, in the first edition of the *Lives* (which he afterward suppressed), says that Leonardo "was of so heretical a cast of mind, that he conformed to no religion whatever, accounting it, perchance, much better to be a philosopher than a Christian." His notebooks, private and informal records as they are, are silent, but it may be surmised that his choice of reason rather than authority would have led him away from the levels of revealed religion. In the subjects that he pursued he had no need of that hypothesis. He sings hymns to Law and Causation:

"Nature never breaks her own law.

"O marvelous necessity, thou with supreme reason constrainest all efforts to be the direct result of their causes. and by a supreme and irrevocable law every natural action obeys thee by the shortest possible process.

"Who would believe that so small a space could contain the images of all the universe? O mighty process, what talent can avail to penetrate a nature such as thine? What tongue will it be that can unfold so great a wonder? Verily none. This it is that guides the human discourse to the considering of divine things."[15]

Leonardo, who sums up war as a "bestial frenzy" (in

[13] McCurdy, *op. cit.*, p. 6.

[14] *Encyclopædia Britannica*, art. "Leonardo."

[15] *Leonardo da Vinci's Notebooks*, p. 117.

the descriptive passage entitled "The Way to Represent a Battle"), was the inventor of numerous engines of war, steam guns and breech-loading arms with screw breech-block, and in the draft of a letter in which he offers his services as architect and military engineer to Ludovico Sforza, Duke of Milan, he claims that he can "construct bridges that are very light and strong and very portable, with which to pursue and defeat the enemy, and others more solid, which resist fire or assault," also "a kind of cannon which is light and easy of transport, with which to hurl small stones like hail," "catapults, mangonels, *trabocchi*, and other instruments of admirable efficacy not in general use," and "armored wagons carrying artillery which shall break through the most serried ranks of the enemy, and so open a safe passage for the infantry";[16] he can also construct "subterranean passages either straight or winding, passing if necessary underneath trenches or a river."[17]

As far as the evidence of Leonardo's manuscripts can substantiate the claims put forward, they have been found to have been correct; and Dr. Müller-Walde,[18] in that portion of his work dealing with Leonardo as a military engineer, has shown that Leonardo did in fact study the construction and use of the engines of warfare mentioned in the first seven clauses of the letter.

In the arts of peace, his schemes and sketches for canalization and the lay-out of towns are no less remarkable. According to specialists' opinions, Benedetto Castelli, who is considered to be the actual originator of the Lombardy canal system, appears to have studied Leonardo's schemes, in which practical standards for hydraulic engineering are

[16] Tanks?

[17] *Codice Atlantico*, 1 391, v.

[18] *Leonardo da Vinci*: *Lebensskizze und Forschungen*, Munich, 1889-90, pp. 139-232.

already worked out.[19] He wished to lay out cleaner and healthier cities, so that the people would not need to live "packed together like goats, and pollute the air for one another," and proposed to Il Moro to build ten cities, each with 5000 houses and accomodating 30,000 inhabitants. These cities are to be seated on rivers regulated by locks; the streets are to be as wide as the height of the houses, and laid out with wide squares and market-places. Moreover, he provides two kinds of streets on different levels, the higher and spotless walks for foot passengers, and the lower for traffic, which can be cleaned by flushing from locked rivers.[20] In his notebooks are found a wealth of designs, exhausting every possible combination of circular and polygonal ground-plans for domed public buildings and churches. As he himself states, it was his intention to write a treatise on the theory of cupola construction. His devices and designs for hydraulic work, and for war-like machines, were, for the most part, within the limits of possible construction in his day. It is otherwise with the problem that occupied so much of his time, that of flight.

He had for many years watched the flight of birds, and made himself, thanks to an amazingly keen power of fixing rapid movement, familiar with every characteristic of wing action. The subject gives its name to a treatise which exists in a more or less complete form—*Il Codice sul volo degli uccelli*, and is also treated in the *Codice Atlantico* and other of Leonardo's manuscripts. The conviction grew on him that men might raise themselves above the earth on wings, for:

"A bird is an instrument working according to mathematical law, which instrument it is within the capacity of man to reproduce, with all its movements, but not with a

[19] M. Baratta, *Leonardo da Vinci, ed i problemi della Terra*, Turin, 1903.

[20] O. Sirén, *Leonardo da Vinci*, Yale University Press, 1916, p. 123.

corresponding degree of strength, though it is deficient only in the power of maintaining equilibrium. We may therefore say that such an instrument constructed by man is lacking in nothing except the life of the bird, and this life must needs be supplied from that of man."[21]

Flight is a natural phenomenon, and consequently its laws are to be deduced by observation of nature. Yet Leonardo doubted the adequacy of strength of the human agent to accomplish more than short flights, and sought to supplement it by a screw-propeller. He has a drawing of a large screw constructed to revolve round a vertical axis. "The notes at the side and below the drawing tell of the materials and dimensions, and reveal also the purpose which it was intended to serve. M. Govi, who first called attention to the significance of these passages, speaks of them as proving not only that Leonardo invented the screw-propeller, but that he had considered small paper models for this purpose, which were set in motion by fine bent steel wires."[22]

He must have, at one moment, at any rate, felt sure of success, when he wrote triumphantly that "the huge bird will take his first flight high aloft on the ridge of his great Ceceri—the mountain between Majano and Fiesole—he will fill the universe with wonder and all writings with his fame." The experimental flight must have failed, but from his own day Leonardo has not been judged by his achievement, for, in the words of his earliest biographer, "his spirit was never at rest, his mind was ever devising new things."

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[21] *Codice Atlantico*, 161, R. a.

[22] *Nineteenth Century*, July, 1910.

CRITICISMS AND DISCUSSIONS.

IMMORTALITY AND MONADISTIC IDEALISM.

The problem of immortality is normally central in a cosmology which conceives of the universe as a spiritual system. Is the spiritual system fundamentally and inevitably personal: a person or a society of persons? Are the careers of finite individuals but passing episodes in a timeless system, or its eternal constituents? In all these problems the issue of immortality is squarely raised. Failure to meet this issue squarely has involved many an idealistic theory in ambiguity and confusion.

Hegel's apparent indifference to the question of immortality, a source of surprise to many a student, is, in the view of Dr. McTaggart,[1] a defect in his philosophy. Dr. McTaggart, himself building on Hegelian foundations, attempts to improve on his master by giving the problem of immortality central place in cosmological discussion. In his *Studies in Hegelian Cosmology* he undertakes a metaphysical demonstration of the eternity of finite selves, and in *Some Dogmas of Religion*[2] he examines three of the more usual arguments urged against immortality and also champions human preexistence. The arguments which he advances in support of what he considers human immortality, the vigor with which he advocates the doctrine of the plurality of lives, the atheism to which he is finally led, are all very significant aspects of contemporary idealistic thought. An endeavor will be made in this paper to formulate Dr. McTaggart's theory of immortality and preexistence, and, in the

[1] *Studies in Hegelian Cosmology*, Cambridge University Press, 1901, pp. 5ff. Cf. Professor Baillie's criticism of Dr. McTaggart's interpretation of Hegel's attitude toward immortality, *Hibbert Journal*, Vol. I, No. 2, pp. 379f.

[2] London, Edward Arnold, 1906. Chapters III and IV of this work have been reprinted under the title, *Human Immortality and Pre-Existence*, New York, 1915.

light of this theory, to estimate his monadistic[3] interpretation and development of idealism.

I.

From the point of view of materialistic monism, human spirit is merely one of the ways in which matter operates when it is in the special form of a human body. So regarded, of course, the immortality of the self would be no more credible than the immortality of digestion. But the independent existence of matter, Dr. McTaggart argues in familiar Berkeleian terms, is a perfectly gratuitous and superfluous hypothesis. Science is by no means committed to a materialistic metaphysic. The "laws of nature" may quite as well be conceived as the laws according to which human sensations are related.

We are therefore not bound to regard the self as a mere activity of the body. Still, "granted that my body could not exist except for knowledge, it may be that the knowledge of my body, by myself or other selves, is a necessary condition of the existence of my self."[4] Dr. McTaggart parries the objection to immortality implied in this second supposition as follows. Sensations do seem to involve some corresponding bodily modification; but this proves at the most that *some* body is necessary to my self and that *"while the self has a body,* that body is essentially connected with the self's mental life."[5] At the death of this my body my self may conceivably transfer its manifestations to another body, either instantaneously or after "a state of suspended animation,"[6] analogous perhaps to dreamless sleep.

Yet, after all, what reason do I have for believing that the self persists while all objects in nature change and pass away? Were the self a mere combination, Dr. McTaggart rejoins, it would be transitory; but, while resembling a combination in that it cannot exist without its parts, it is unlike a combination in that its parts cannot exist without it. It is a complex which cannot disintegrate; it can perish only through annihilation, and we are not justified in contemplating such an eventuality.

In thus meeting the more obvious and usual arguments urged against immortality, Dr. McTaggart has no illusion that he has

[3] The phrase "monadistic idealism," I believe, is Professor Pringle-Pattison's. Cf. *Hibbert Journal,* Vol. V, No. 1, p. 197.

[4] *Some Dogmas of Religion,* p. 103.

[5] *Ibid.,* p. 105.

[6] *Ibid.,* p. 104.

reached positive certainty on the subject. Doubts beset us, and we look for more conclusive assurance. Some seek this assurance in "psychical research." While our author is not prepared to scoff at the ghost-seers, he expects no real proof of immortality from even the most authentic case of apparition. For a man might conceivably, before his death, initiate a chain of circumstances which would cause his apparition to be seen when he himself was really no more. Conclusive proof of immortality can come, if at all, only from metaphysics. If the general nature of reality involved the existence of finite selves, if the existence of finite selves, and of each finite self, were eternally necessary, the recognition of these truths would really assure us of immortality.

Such a metaphysical demonstration of human immortality is undertaken in *Studies in Hegelian Cosmology*. All reality is spirit, and "it is the eternal nature of spirit to be differentiated into finite spirits."[7] Can we, in addition, maintain that each finite spirit is eternal—or is each differentiation a step, itself transitory, in an eternal series of differentiations? Moreover, granted the first alternative, is man such a finite spirit? On the answers to these two questions hangs the whole issue of immortality.

Taking the last point first: Are our selves among the fundamental differentiations of spirit? Reality, we learn from Hegel, is characterized by a certain unity of individuals: a unity which is wholly in each of the individuals (else they would lack the requisite reality); yet is not wholly present in each individual separately (else the unity of the individuals would itself be destroyed); nor is it present in the mere assemblage of them (else it would have nothing to do with them as individuals); nor again is it present only in the mutual determination of the individuals (for that would imply that the individuals have meaning of their own apart from the unity). It must be a unity which is wholly in each of the individuals and is the bond which unites them. Unless we adopt this view we are forced to choose between undifferentiated unity (itself meaningless and making experience meaningless) and a plurality of isolated individuals (the inadequate view of the categories of Essence).

"The self answers to the description of the fundamental differentiations of the Absolute. Nothing else which we know or can imagine does so."[8] A self is finite. It is not the only reality in the universe, yet you cannot draw the line separating it from the rest

[7] *Studies in Hegelian Cosmology*, p. 7.
[8] *Ibid.*, p. 26.

of the universe. This paradoxical nature of the self is explained only if we regard it as one of the fundamental differentiations of Reality. These differentiations involve the same paradox. Everything is contained in each individual differentiation, yet nothing is contained in each differentiation in such a way as not to be also ouside it. "The Absolute must be differentiated into persons, because no other differentiations have vitality to stand against a perfect unity, and because a unity which was undifferentiated cannot exist."[9]

Passing now to the second question: Are our selves eternal? Granted that selves are fundamental differentiations of the Absolute, may it not be that the Absolute is "differentiated by means of an unending succession of individuals, each of whom has only a limited existence in time?"[10] But how is it possible for the selves to perish? The individuals are what they are because of the unity which they embody: each of them is a characteristic embodiment of the nature of the unity. Suppose one of them were to perish, another must take its place. If that other were the same in nature, wherein would it be a different individual? And if it were a really new individual, of a different nature, we should be forced into an absurdity. For, unless we abandon the pure Hegelian view of the absolutely reciprocal relation of the unity and its differentiations, and hold with Lotze the view that the Absolute is something more and deeper than the unity of its differentiations, we are compelled to recognize that a breach in the continuity of the fundamental differentiations would be a breach in the continuity of the Absolute—an unthinkable situation. Breach in continuity is admissible only if we conceive reality as "consisting of moments, of which one may change without affecting the other"[11]—a characteristic of the categories of Essence, especially of the category of Matter and Form, which is transcended in the advance to the categories of the Notion.

Our selves are thus immortal. This conclusion, according to Dr. McTaggart, implies not only the continued existence of the self after death, but its existence before birth. An argument which disproved preexistence would jeopardize immortality. "If the universe got on without me a hundred years ago, what reason could be given for denying that it might get on without me a hundred years hence?"[12] Why is it, then, that the typical Western mind has

[9] *Ibid.*, p. 17.

[10] *Ibid.*, p. 27.

[11] *Ibid.*, p. 32.

[12] *Some Dogmas of Religion*, p. 114.

regarded the belief in preexistence as "strange and improbable"?[13] Chiefly because we have no memory of any previous existence of ours. But, according to Dr. McTaggart, personal identity is not a matter of memory; it is an identity of substance. If at my death a self with the same attributes should come into being, the continuity of the attributes would be sufficient to preserve personal identity "not because it would be sufficient if the substance changed, but because it proves that the substance remains unchanged."[14] What we have is not the annihilation of one self and the creation of another, but the continuity of the same self through experiences of so serious a character as death and rebirth.

The doctrine of the plurality of lives should appear reasonable to any believer in immortality. An endless, deathless existence in the future would bear so slight a resemblance to our present life as scarcely to deserve being regarded as its continuation. The adoption of the hypothesis of preexistence, moreover, enables us to explain in a more satisfactory way than is otherwise possible, certain puzzling features of our present life. In the same environment different tendencies and qualities which we ambiguously call innate manifest themselves in different men. These tendencies and qualities are often of the sort which are due in the lives of other men to the condensed results of experience. On the theory of preexistence these tendencies and qualities are naturally explained as being indeed the condensed result of experiences in past lives. This explanation is more satisfactory than the explanation in terms of heredity. Again, the usual explanation of the sudden growth of intimacy in certain personal relations, as due to the capriciousness of sexual desire, is inadequate, since the puzzling sudden intimacy is to be found in friendships which have no connection with sexual desire. "On the theory of preexistence such relations would naturally be explained by the friendships of past lives."[15]

Now, to be sure, unless we had reason to believe that the interests of spirit are so predominant as to find in the long run

[13] *Studies in Hegelian Cosmology*, pp. 47ff. Cf. Lotze, *Metaphysic*, Section 245 (English translation, 2d ed., Oxford, 1887, Vol. II, p. 182). Dr. McTaggart attributes the characteristic Western indifference or hostility to this doctrine to the attitude of the Christian Church which has championed immortality and ignored preexistence, although, in his belief, the former involves the latter, and although there is apparently nothing in preexistence incompatible with fundamental Christian dogma. Cf. also *Some Dogmas in Religion*, pp. 112ff.

[14] *Studies in Hegelian Cosmology*, p. 51.

[15] *Some Dogmas of Religion*, p. 121.

satisfaction, it would be impossible to see how a love constituting the chief value and meaning of a person's life could have its way after death: how two could love again unless chance brought them once more together, or how a love denied fruition could remain unextinguished through eons of separation and new activities. (Though, to be sure, this embarrassment of love would seem to be the case whether we believed in preexistence or in the more usual conception of immortality.) Dr. McTaggart himself insists that the significance of love for spirit is very great, indeed that love is the finality and the perfect manifestation of the Absolute.[16] He is therefore inclined to believe that love is not the effect of proximity in personal relations, but its cause.

From this way of viewing the universe *sub specie amati*[17] Reality is seen as essentially spiritual; it manifests itself as eternal selves. The Absolute is a system of selves-in-relation. Now, then, the question arises, If finite selves are eternal, is the eternal Absolute a self? It is a unity of persons, Dr. McTaggart answers, but a unity or community of persons need not itself be personal. To be sure, the Hegelian Dialectic does not explicitly deny personality to the Absolute. That the Absolute may be a self remains possible under certain conditions, some of which Lotze attempts to point out in his *Microcosmus*.[18] Lotze regards the opposition of the ego to a non-ego, not as essential, but rather as a limitation, to personality. In the being of the Infinite we do not find this limitation;

[16] *Studies in Hegelian Cosmology*, p. 285: "The Absolute can only be perfectly manifested in a state of consciousness which complies with three conditions. It must have an absolute balance between the individual for whom all reality exists, and the reality which is for it—neither being subordinated to the other, and the harmony being ultimate. It must be able to establish such a unity between the self and the not-self, that the latter loses all appearance of contingency and alienation. And, finally, in it the separate and unique nature of each individual must be found in its connections with other individuals. We have found that knowledge and volition comply with none of these conditions. There remains only one other alternative at present known to us—love. I have tried to show that in this case all three conditions are fulfilled." The love of which Dr. McTaggart speaks is not "love of Truth, or Virtue, or Beauty, or anything else whose name can be found in a dictionary"; nor sexual desire; nor love of God, for God is not a personal unity; nor yet "benevolence, even in its most impassioned form" or widest extent, for we cannot love "an indefinitely extended Post Office Directory." He means rather "passionate, all-absorbing, all-consuming love,. . . .the love for which no cause can be given, and which is not determined by any outer relation, of which we can only say that two people belong to each other—the love of the *Vita Nuova* and of *In Memoriam*." (*Op. cit.*, pp. 260, 289, 290, 291.) So Dante, in the last line of the *Paradiso*: "L'Amor che move il sole e l'altre stelle."

[17] *Studies in Hegelian Cosmology*, p. 280.

[18] Book IX, Chapter IV (English translation, Edinburgh, 4th ed., Vol. II, pp. 659ff, especially pp. 678ff). Cf. *Studies in Hegelian Cosmology*, pp. 64ff.

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accordingly perfect personality is in God only: our personalities are but pale copies thereof. But, while the consciousness of a non-ego (that is, in Hegelian terms, the consciousness of another ego) does not constitute personality, Dr. McTaggart insists that it is an essential condition of personality. The unity of the finite self, "by virtue of its simplicity and indivisibility....excludes its differentiation from itself in one sense, while includng them in another. But the Absolute cannot exclude its differentiations from itself in any sense."[19]

To be sure, if we broadened the term "personality" to cover all spiritul unities, then we could speak of the Absolute as a person. But, in the first place, this would rob us of a term for personality in the narrower sense, in exchange for the dubious advantage of giving us two terms for spiritual unity. And, in the second place, it would justify us in calling "every college, every goose-club, every gang of thieves"[20] a person. Moreover, we are not bound to say that the impersonality of the Absolute makes it lower than a person. A finite individual's perfection is the perfection of a person. The Absolute's perfection is the perfection of a system or community of persons. The two are complementary. The Absolute is spirit, and "all Spirit is personal, but it is many persons, not one person, although it is as really one Spirit as it is many persons."[21]

II.

This theory is indubitably and explicitly atheistic. To be sure, the majority of theists believe in immortality, and the majority of the believers in immortality are theists, and the usual view has been that unless one believes in God one cannot believe in the immortality of the soul. Dr. McTaggart sees no logical connection between the two beliefs. Indeed, far from strengthening the belief in immortality, consistent theism weakens it. If we postulate a Creator of the souls of men (on the supposition that finite beings could not have existed from all eternity) the belief in immortality is jeopardized. If my role in the universe is such that it does not involve my existence from all eternity, how can it be shown that it involves my existence to all eternity?[22] To be sure, that God, a benevolent Creator, should destroy, or allow to be destroyed, a human soul which

[19] *Studies in Hegelian Cosmology*, p. 83.
[20] *Ibid.*, p. 86.
[21] *Ibid.*, p. 214.
[22] *Some Dogmas of Religion*, p. 277.

He has once created, may be an evil; but there is evil in the universe, and it may include this particular variety, for all that we are assured to the contrary.[23] The more one recognizes the eternity of finite selves, the less necessity one sees for postulating a Creator of selves, and the less real does the theist's God appear. Thus we are led from the original view that atheism precludes the belief in immortality, to the view that it is rather theism which weakens the belief, and that the assurance of immortality consistently involves atheism.

The term atheism, used in connection with an idealistic system, need not appear strange. This position, defended unambiguously by Dr. McTaggart, is, in his opinion, similar to the position of Fichte in his earlier system and to the position of Hegel.[24] On the other hand, Lotze, whom our author considers "of all the theists of the nineteenth century....philosophically the most important.... regards immortality as quite undemonstrable and as very doubtful."[25] The view before us is thus the precise reverse of Lotze's. The only kind of God that Dr. McTaggart would admit at all is a non-omnipotent and non-creative one; and he sees "only one reason why we should not believe in his existence—namely, that there is no reason why we should believe in it."[26]

The Absolute, then, is not a self. It is a society of selves, a unity of persons perfectly manifested in love—a sort of College.[27] Selfhood and the love of selves are no passing phases of reality; they are the heart of the universe. Each finite self is a unique differentiation of the Absolute and is therefore imperishable as a finite self. Apparently we are offered genuine immortality in this theory; even more, preexistence as well: the assurance of personal identity throughout. But on what terms? Not in terms of memory. I shall continue to exist after death as a self, but I-myself-here-present shall not then be aware of the fact. My self's successor will be myself, not because he remembers my experience and recognizes them as his own, but because of a substantial bond uniting the two life-spans, which makes my later life-character share in the

[23] *Ibid.*, p. 278.

[24] *Loc. cit.*

[25] *Ibid.* (Cf. *Microcosmus*, Book. IX, Chapters IV-V, also *Metaphysic*, Section 245.)

[26] *Some Dogmas of Religion*, p. 260.

[27] R. R. Marett dubs it "Trinity basking in a perpetual Long Vacation"; see *Mind*, N. S., No. 43, July, 1902, p. 391.

nature of the former. My self's successor will be just what I would have been in his place; in short, he will be myself.

Continuity of consciousness, and the consciousness of continuity, are thus renounced. But can one dispense so readily with the factor of memory? As Bradley puts it, "The man in the past or in the future who knows nothing about me, whatever else he is, after all will not be myself....That what we have done in this life may cause our future love might be true, and yet, if nothing is remembered, individual continuance might to us then mean nothing."[28] Dr. McTaggart would say that, while the second self will not feel that it is the same as the first, it will nevertheless be the same. One might well retort that, since the second self will not feel that it is the same as the first, it might as well not be the same.

Theists, believing that each man lives his one life on earth and is thereafter immortal, have been confronted with the difficulty of contemplating the immense assembly of spirits that would thus be accumulated through the ages. William James, while he urges us to be forbearing and democratically tolerant with the endless throng of fellow-immortals, realizes the mental enormity of the task. "The very heavens themselves, and the cosmic times and spaces, would stand aghast....at the notion of preserving eternally such an ever-swelling plethora and glut of it."[29]

On Dr. McTaggart's theory we are perhaps spared this hardship. Indeed, if selves are the fundamental differentiations of the Absolute, if their interrelated activities and loves constitute the Absolute system itself, how can we admit an increase in their number? An increase in the number of selves would involve an increase of the universe. The entire position of Dr. McTaggart would be menaced by the possibility of one real self's *beginning* its career in time. We thus seem compelled to accept the doctrine that the number of selves-in-relation constituting the universe is constant. The eternal existence of human individuals on earth, however, can scarcely be admitted; we are, moreover, assured that their number has been on the increase for some time. Are we to be asked, then, to conclude that multitudes of us have drunk the waters of forgetfulness in non-terrestrial regions before being reborn here on earth, and that this immigration of selves on a large scale is going on all the time? And is one to presume also that the self-in-transit is in a state of "suspended animation," and that

[28] *Essays in Truth and Reality*, Oxford, 1914, pp. 455, 457.

[29] *Human Immortality*, 1898, p. 36.

the unsatisfied love-quests of certain souls on earth and their longings for they-know-not-whom are to be explained as due to the failure of certain other loving souls to follow them from one bodily field of operations to another? This difficulty is expressed in the space-time language of every-day speech, but stating the point in Dr. McTaggart's own language of mild immaterialism would not remove the difficulty.

We are involved in further embarrassments. According to the theory before us, the love of two people is "the expression of the ultimate fact that each of them is more closely connected with the other than he is with people in general."[30] The existences of two such people are essentially bound up; they are "bound up with one another, not for one life only, but for ever."[31] Now, it is presumably taken for granted by Dr. McTaggart that a self's character does not admit of its being involved in such intimate communion with more than one person. Otherwise we should have to conceive the possibility of a future Jonathan spurning his David, of a Tennyson finding Hallam tedious. Assume that Dante's communion with Beatrice lacks the eternal character: what is in our way of supposing that Beatrice's lover might not be, in a succession of life-spans, the lover of Laura and of Heloise, and the places of these in the lives of subsequent Petrarchs and Abelards be taken by the Donna of the *Vita Nuova*? Moreover, a Tennyson to whom *In Memoriam* is but something to read, a Dante to whom Beatrice is no more than she is to us—these were odd successors of their former selves!

Yet, grant the undying fire of the kind of love that is glorified in the *Divine Comedy*, grant Hallam's permanent appeal, it may yet be retorted that these are, after all, quite exceptional. Are we, then, to think that the usual interrelations of selves involve a plurality of loves in a plurality of lives? Perhaps this view is not altogether outside Dr. McTaggart's horizon. Tastes change; as he remarks in a somewhat different connection, "a Viking or a Maori warrior might well find that the prospect of an immortality without fighting made the universe intolerable."[32] But in the course of time his demands may change. And so may his love. One of the last merits which our author finds in the plurality of lives is that it affords an opportunity for an eternal variety of self-activity. "We cannot spend our youth both in the study and in the saddle.... We cannot

[30] *Some Dogmas of Religion*, p. 136.

[31] *Ibid.*

[32] *Ibid.*, p. 52.

learn the lessons alike of Galahad and of Tristram and of Caradoc. And yet they are all so good to learn. Would it not be worth much to be able to hope that what we missed in one life might come to us in another?"[33] It is perhaps not absurd to suppose that a self, careering in turn through the life-experiences of a Tristram, a Galahad, a Caradoc, will not keep on realizing his life's meaning and value in the same Iseult—unless indeed the nature of the latter exemplified love's perennial adaptability.

Dr. McTaggart is quite willing to admit that the love of two people for each other "would not involve their meeting in every life, any more than it would involve their meeting every day of each life. Love can survive occasional absences, and is often even stronger for them. And....the universe is on a large scale, which might require long absences."[34] But even on this supposition the hardship remains. Granting the likelihood of periodic resumption of the "passionate, all-absorbing, all-consuming love"[35] uniting two selves, what of the lifelong intervals of lovelessness? On Dr. McTaggart's estimate of the significance of love for self, this embarrassment appears very serious.

These perplexities involved in the view of the world *sub specie amati* only suggest the real difficulties in Dr. McTaggart's monadistic idealism. Perhaps the fundamental source of them all is to be found in his determination to equate reality with selfhood, and in his conception of selfhood. The cosmic process is described by him as consisting entirely of the interrelated activities of selves. This type of idealism is involved in an ambiguous account of the resistantly impersonal nature-medium in which selves seem to operate, and in a correspondingly ambiguous account of selfhood and personal identity.

Following in Berkeleian paths, Dr. McTaggart proves to his own satisfaction that "matter is only an appearance to the mind which observes it."[36] This view, in the way in which it is presented, is inadequate, not in that it is entirely false, but in that it is incomplete. It is only half a view. The statement that matter cannot exist independently of spirit or, to be more precise in this particular connection, independently of selfhood, is true only in so far as it is completed by its corollary converse. If matter cannot

[33] *Ibid.*, p. 138.

[34] *Ibid.*, p. 136.

[35] *Studies in Hegelian Cosmology*, p. 260.

[36] *Some Dogmas of Religion*, p. 83; cf. pp. 79ff.

exist independently of selves, it is because it is not a self-subsistent reality but one fundamental factor in the cosmic process of experience, which it does not exhaust, but which "selfhood" likewise does not exhaust.

To be consistent, Dr. McTaggart should have followed his negative answer to the question, Is my self an activity of my body? by a somewhat different answer than the one he gives to the question, Is my present body an essential condition of the existence of my self?[37] Had the latter question read: "Is my present body an essential condition of the existence of my present self?" it would be difficult to see the possibility of an intelligent negative answer. But Dr. McTaggart, viewing the continual change of bodies, views the self as continuously identical. He can conceive of one self as the tenant of several bodies in succession; but it must be the same tenant notwithstanding. Now we may ask: Is not the self inevitably a tenant of some sort? That is to say, is not an impersonal material medium or "body-appearance" of some sort as indispensable to its selfhood as is intercourse with other selves? It is surely as indispensable to the only kind of selfhood of which we have any knowledge.

Dr. McTaggart does not exactly evade the issue, but he does not meet it squarely. He recognizes that "no self can be conceived as conscious unless it has sufficient data for its mental activity."[38] But, he argues, "it does not follow, because a self which has a body cannot get its data except in connection with that body, that it would be impossible for a self without a body to get data in some other way."[39] That is to say, it does not follow, because a conscious self requires sufficient data for its mental activity, that a non-conscious self need be similarly limited. This may be incontestable: but what is the content or the nature of the "non-conscious self" so conceived? Are the fundamental differentiations of the Absolute, in Dr. McTaggart's view, "conscious" or "non-conscious," in the above meaning of these two terms? Dr. McTaggart concedes that "*while the self has a body*, that body is essentially connected with the self's mental life."[40] This concession is misleading and insufficient. Working for the time being on the theory that the fundamental differentiations of the Absolute are selves, we are bound to say: If mental life is not essential to selfhood, it matters com-

[37] *Ibid.*, pp. 79ff, 103ff.

[38] *Ibid.*, p. 105.

[39] *Ibid.*

[40] *Ibid.*

paratively little for our purposes whether a body be essentially connected with that mental life; but, if mental life is indeed essential to selfhood, then the phrase "*while* the self has a body" is unwarranted.

The important question, after all, is whether a "mental life" (in the above sense) is a *sine qua non* of selfhood. In a universe described as fundamentally a society of selves, what is the role and the content of the self "in a state of suspended animation in the interval between its possession of its two bodies"?[41] How is it related to selves-with-bodies and to other selves "in a state of suspended animation"? Moreover, how is the reality of these two bodies to be conceived? If we cannot say, in Dr. McTaggart's phrase, that the self in suspended animation "has" either of these two bodies, how are they at all real, if body, or matter, as we have been told already, is "only an appearance to the mind which observes it"?[42] To what mind are two such bodies present as appearance? Perhaps to a mind regarding them as the no-more and the not-yet body of the self in suspended animation? But, in that case, we must admit that selves-with-bodies may be in relation with selves in suspended animation. On this alternative Dr. McTaggart should give more countenance to "psychical research" and kindred phenomena than he appears inclined to do. Indeed, it is not easy to see precisely what is intended in the theory before us by a self "in a state of suspended animation."

The philosophy of Dr. McTaggart is an attempted revision of Hegelian idealism in personalistic terms; yet in its very conception of personality is fails to utilize one of the chief gains of nineteenth-century idealism, and, instead of advancing beyond Hegel, it retreats to the pre-Kantian substantialist views of the self. To Dr. McTaggart the self, whose identity he traces and whose immortality and preexistence he champions, is not fundamentally a transcendental unity of apperception or any other kind of conscious unity. The identity is an identity of substance, the preexistence and immortality are the preexistence and immortality of a continuous self-identical entity. The hand is the hand of Hegel, but the voice is the voice of "rational psychology" and the scholastic simple substance.

Yet Dr. McTaggart recognizes and insists on "the continuous development of the self."[43] But is this continuous development a development of the very essence of the self? Hegel's identity is

[41] *Ibid.*, p. 104.
[42] *Ibid.*, p. 83.
[43] *Studies in Hegelian Cosmology*, p. 52.

an identity of process, an identity, not in spite of, but in and through, change and differences. For Dr. McTaggart personal identity is in the last resort an identity of substance. In all changes "there is an aspect which is permanent and unchanging, and it is on that aspect that our attention is fixed when we speak of identity of attributes through change."[44] Accordingly, the self's identity is not affected by its migrations from body to body, nor by the periodic snapping of the thread of memory and consciousness generally. All these circumstances are really external. The very fact that there is no evidence of the continuous persistence of these is, to Dr. McTaggart, a proof that they are not, after all, fundamental. "We may lay down a general principle as to the continuity of external circumstances from life to life," he writes. "In so far as it is necessary to the continuous development of the self, it will be present. In so far as it is not present, we may be sure that it is not required for the continuous development of the self."[45]

The above passage partakes of the dogmatic. *What*, after all, are all these selves which are solemnly declared to be the fundamental differentiations of the Absolute, but of which no known experience seems to be fundamental? Dr. McTaggart speaks of Reality as a society of selves, a system of personal relations, but his selves and persons are really monads, substantial entities. Hence the unreal character of what he represents to us as personal identity and continuance, immortality and preexistence. These scarcely seem to concern the concrete living self of experience. It is difficult to see "what special interest a man can take in the unknown series of those who are to inherit his soul-substance, any more than in the equally unknown series of those who had the usufruct of it before him."[46]

Leibniz's monads are self-complete individuals, but the totality of them does not form a cosmos. Dr. McTaggart's monadism would overcome the difficulty which Leibniz tried, and failed, to meet with his preestablished harmony, by conceiving of the finite individuals constituting the universe as selves. Selves, being necessarily in relation, do form a cosmos. But Dr. McTaggart's selves, conceived in too substantialist terms, fail to allow for an adequate recognition of the actuality of the impersonal factors in the world of self-activity, or for an adequate interpretation of the metaphysical role and significance of consciousness.

[44] *Ibid.*, p. 38. [45] *Ibid.*, p. 52.

[46] Professor Pringle-Pattison in *Hibbert Journal*, Vol. V, No. 1, p. 200.

For a philosopher of experience—for a true idealist—Dr. McTaggart does scant justice to the "nature" factor in experience, and for a consistent immaterialist he lacks the requisite boldness and capacity to ignore the facts of life. His championship of preexistence is brilliant; his critique of theism, searching and to be reckoned with. But his theory of immortality is in the last resort a misnomer. A theory which views the destiny of the finite self in terms of the conservation and attainment of values may conceivably renounce the consciousness of continuity and personal identity after death, so long as the ideal causes with which the self has been identified and in which its whole being has found meaning and worth are assured of continued vitality and fruition, so long as the unique values of a self's life are being eternally conserved and realized. But if the career of the finite individual is conceived in exclusively existential terms: if immortality of the self is thought of as the eternal continuance of a substantial entity of some sort, then continuity of consciousness and the consciousness of continuity appear indeed indispensable. An eternal continuity of the self's own existence which does not include the self-consciousness of continuity is, after all, in spite of the most brilliant dialectic, a continuity of too ambiguous a character to deserve the name immortality.

If, in spite of the above difficulties, Dr. McTaggart remains under the impression that his theory demonstrates the eternity of the self's career, this is clearly due to the fact that throughout his discussion he "substitutes for the living and concrete unity of self-consciousness, as manifested in experience, the numerical unity of a soul-substance or indestructible soul-atom on which the personal unity of experience is supposed to depend, or in which it is somehow housed."[47] The Love which he regards as the supreme manifestation of Reality is a love of substantial selves which even in this most intimate communion resist real union and remain self-identical and distinctive throughout. His society of selves has no personal character as society; his "college" is in the last analysis an assembly, not a unity. Over-individual systems of selfhood and over-individual values receive inadequate attention in his thought. His conception of immortality and his treatment of God suffer in consequence.

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[47] *Ibid.*, p. 199.

LOGICAL ATOMISM AND THE LAW OF PARSIMONY.

I feel—reluctantly—that I can scarcely avoid replying to Mr. Heath's criticisms of my article on "The Law of Parsimony" (*The Monist*, July, 1919). I know that Mr. Heath is well entitled to defend Mr. Russell's views, since he knows a great deal more about the theory of logical atomism than most of us. For that reason I should like to know what answer Mr. Heath would make to my arguments. I do not suppose that these arguments are unanswerable, but, as it seems to me, Mr. Heath has not replied to them at all.

I contrasted two views of the physical world. According to Mr. Russell's view this world consists (1) of my sense-data (actual and remembered), (2) of other people's sense-data (actual and remembered), and (3) of possible sense-data (i. e., of *sensibilia* which are not actually sensed by any one or remembered by any one). Given these entities, the laws of physics can be expressed as logical constructs from them or their constituent parts. According to the other view the world consists of unperceived physical objects which, when they stimulate another unperceived physical object (my body and brain) cause the existence of the sense-data actually perceived.

My principal contention was that the Law of Parsimony cannot decide between these two theories. The second offends the demand for simplicity by assuming unverifiably that unperceived physical objects exist. On the other hand, it does not require us to suppose that there are any sensibles except those actually perceived. Mr. Russell's theory avoids the first luxury but it requires the second. And the hypothesis of the actual existence of *possible* sensibles is just as inimical to the principle of parsimony as the hypothesis of unperceived physical objects, besides having peculiar difficulties of its own.

Mr. Heath's contentions have nothing to do with this argument because he states that the logical atomist merely pares away any kind of entity of which he has no direct awareness. I should be glad to know what logical atomist is ever directly aware of unperceived *sensibilia*.

As I have argued, any explanation of the world must take account of the continued existence of much that is not any one's

perceived sense-datum. Thus if I receive a letter from America I am bound to think that this letter, in some sense, existed continuously from the time it was written to the time it was received. But during that period it was perceived at odd moments only and by a few persons, i. e., by the writer, some postmen and sorters, and myself. If it took three weeks to deliver it was not actually perceived for more than a few minutes. Thus, on Mr. Russell's theory, this particular collection of sensibles was, for some weeks, nothing but a collection of *unperceived* sensibles.

And it is easy to show, I think, that this assumption of the existence of unperceived sensibles, implied by Mr. Russell's theory, is really a very difficult one. If I am at liberty to assume that *any* of the sense-data which I *should* perceive *if* I looked at the letter, literally exist when I do not perceive them, I am also at liberty to suppose that the sense-data which a rat, or a fly, or an astigmatic octogenarian in the throes of sea-sickness would perceive might also literally exist at any time or place. According to this theory I make no difference to possible sense-data by actually perceiving them. When I open my eyes, standing erect, I merely select some of them. Similarly, I merely select some of them when I am giddy or stand on my head. If the former were there all the time, why not the latter? Any theory which avoids this consequence is surely, *pro tanto,* simpler; and if sensibles exist only when they are sensed, and the differences in them are due to differences in my nervous system when related to other physical objects in an unusual fashion, this consequence is avoided altogether. *Because* the physical objects are the same they *must* cause differences when differently related.

This is the main point, but perhaps I should say something concerning Mr. Heath's other criticisms. I never said that "the sole aim of science cannot be descriptive because models are widely used" (Heath, p. 449), whatever this extraordinary statement can be taken to mean. I said that the sciences are inductive as well as descriptive, that induction is inference, and inference not description. I added that models are illustrative and always contain more than a bare skeleton of logical relationship, so that if the goal of science is the discovery of logical relations, any model must contain an irrelevant addition.

For the rest, Mr. Heath argues that Dr. Schiller's view is at the back of my contentions; and he then attacks Dr. Schiller. I thought I had put my contentions pretty well to the front and I

disclaim this identity. In any case, Dr. Schiller is very well able to defend himself, but I do not see why I should be dragged into this particular *fracas*.

Perhaps I may be permitted to add that the sentence in my article beginning "If, then, all truth is discovery" (p. 343) has a "not" omitted by some one's inadvertence. It should continue "it is hard to suppose that *this* discovery should *not* have preeminent importance," etc.

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In reply to Professor Laird's courteous note I should like to deal with two points only.

1. I did not intend to belittle those grave difficulties in the way of a thoroughgoing logical atomism which Professor Laird has so well expressed. My sole object was to show that the complexities introduced by the enormous number of *sensibilia* are not inconsistent with the use of Occam's razor. For, in limiting—as it does—the *type* of entity assumed, the use of the razor by Mr. Russell may well lead to complexities of description of any perceptual fact. Harris's zoo may have to be consulted, as Professor Laird suggests (p. 334). And yet to condemn logical atomism as inconsistent with the principle of parsimony is to confuse the latter, as I am still inclined to think Professor Laird does, with Mach's "principle of economy." For the economy contemplated by Mach was economy of description, and *that* is attained by an immense multiplication of entities—atoms, electrons, and the like. That is why, as Professor Whitehead puts it, physicists and chemists "have dissolved the simple idea of an extended body, say of a chair, which a child understands, into a bewildering notion of a complex dance of molecules and atoms and electrons and waves of light. They have thereby gained notions with simpler logical relations" (*The Organisation of Thought*, p. 131). On the other hand, the "principle of parsimony" seeks economy in the kind of entity assumed, accepting the resulting compexity of description with unconcern.

2. This leads me to my second point. It is true that Professor Laird does not argue in so many words that the sole aim of science cannot be descriptive because models are so widely used. But he ***does*** urge that if the sole aim of science is descriptive there is no justification for models. And that is sufficient for the purpose of

my criticism. He says (p. 329), "If the sole aim of science were the discovery by analysis of the logical relations between phenomena, a large number of suggestions in scientific works would have, at best, the value of mere illustrations. For instance, the desire to suggest or construct a model acting according to any given formula would have no scientific justification. When the equations have been discovered, where is the need for a model?" Now models never are used "when the equations have been discovered." Their function is to help forward the discovery of the most general equations. Thus Maxwell's electro-dynamical models served as stepping-stones to a descriptive mathematical system of a more general form than could have been readily developed without their use. As Boltzmann pointed out, in Maxwell's later papers and in his text-book the formulas more and more detach themselves from the models. Hence I contend that, even if science simply seeks general descriptions of the relations holding between phenomena (which is what I meant by speaking of its sole aim as descriptive), there is still a legitimate place for model-building. For that process is not just an incomprehensible little game scientists amuse themselves with, but has its own special function in the development of generalized descriptions.

In conclusion, may I say that I regret having forgotten how unwelcome (and even dangerous) it is to see similarities in the views of rival philosophers. But when Professor Laird, noting that Mr. Russell's use of the razor leads to a theory simpler only in certain respects, concludes that the whole process is rendered "subjective" (p. 332), then there is surely some similarity to Dr. Schiller's claim that it is not "ethically neutral." However, as Professor Laird says, Dr. Schiller can take care of himself.

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A FORGOTTEN PHILOSOPHER.

M. Remy de Gourmont, in a charming little essay on Helvetius in the third series of his *Promenades Philosophiques* (1909), expresses the belief that it is a good symptom, as regards the state of our intellectual health, that, thanks to the efforts of M. Albert Keim, Helvetius has been made the fashion again. He goes on to say: "To-morrow it will be Holbach, D'Alembert, and Tracy, the master of Stendhal; all these eighteenth-century philosophers, so simple, so clear, so human. Absurd German metaphysics has annihilated them for sixty years, but it would seem that their day of *revanche* is at hand. The dry notion of abstract duty according to Kant has had its day. People are beginning to understand that the first duty of man is to be happy. If not, of what use is life?"

For several years I have felt deeply grateful to M. de Gourmont for this kindly prophecy, it having fallen to my lot to rescue Holbach from oblivion, in an academic sense, although I could hardly be said to have made him *à la mode*. However, I am emboldened to pursue my studies of obscure French philosophers of the eighteenth century, such as Holbach, N. A. Boulanger, and Volney, knowing that M. de Gourmont's shade approves. Such knowledge is not without sweetness to a devotee of the author of *La nuit au Luxembourg*.

Holbach, very few will remember, was a wealthy patron of philosophy and an intimate friend of Diderot. His salon was the meeting-place of the Encyclopedists whose activity helped so much to prepare the intellectual ground for the French Revolution. Holbach himself, although an amateur, translated and wrote some fifty books on science, theology, politics, morals, and philosophy, only one of which is widely known, the famous *Système de la nature* published in 1770. This book is a frank exposition of scientific materialism, atheism in the good old eighteenth-century sense, and a kind of socialized Epicureanism, which created such a sensation in its own day that religion had as its protagonist against this monster no less a person than Voltaire. Holbach died early in 1789 without enjoying the fruits of his labors in behalf of a new heaven and a new earth.

Holbach's philosophical ancestry is easy to trace. As M. Soury has said in his *Bréviaire de l'histoire de matérialisme* (1881), "this

noble and ancient doctrine, materialism, has enlisted some of the finest minds and the most serene figures of all the ages; Democritus, Epicurus, Lucretius, Gassendi," and he might have added, Holbach, whose debt to Lucretius and Petronius is obvious. Holbach also supplied the notes for Lagrange's translation of Seneca, and urged his translation of Lucretius. He also owes much to Hobbes, Locke, Spinoza, Condillac, as well as to the German natural science and English rationalism of the seventeenth century. His obligation to his immediate predecessors in France is great, among the most obvious being Bayle, Saint-Evremond, Fréret, La Mettrie, Burigny, Bourgainvilliers, Boulanger, Dumarsais, and Mirabaud. His debt to his contemporaries, Diderot, Helvetius, Raynal, and others is by no means to be disregarded.

Holbach's influence on young men like Naigeon and Lagrange, who spent years in his company, is direct. He also knew Condorcet, Volney, and Cabanis, who frequented his salon in its later days, but were more assiduous at Mme. Helvetius's, whose salon at Auteuil perpetuated the philosophic traditions of his own. St. Beuve, in his *Causeries,* J. H. Fabre, author of *Les Pères de la Révolution* (1910), and Picavet, in his excellent work on the Ideologists, are certain of Holbach's influence on these men and on Destutt de Tracy, Dupuis, Garat, Brousais, Drouis, and Cousin; and there can be no doubt that this influence extended to other ideologists and philosophers of the Revolution. This, however, is an interesting problem yet to be worked out.

Perhaps the most important question relating to Holbach is his exact contribution to the Revolution. It is generally admitted that there is a relation between the philosophy of the eighteenth century and subsequent events. A revolution was prophesied by the clergy of France in an official utterance as early as 1765, and foreseen by Argenson, Voltaire, Grimm, Seguier, and others. All the hostile writers of the time lay the blame of the Terror on Holbach and his *conjuration philosophique,* whereas the most favorable authors give him his share of the credit due to the reformers. It is certain that his works were widely diffused at this time in popular form, and M. Picavet points out that the Constituent Assembly and even Louis XVI himself, in his letter to the Assembly in 1791, used the language of Holbach and Helvetius. Excellent examples of the ecclesiastical and royalist reactions to Holbach are to be found in such books as Abbé Barruel's *Mémoire pour servir à*

l'histoire de Jacobinisme (Hamburg, 1798), and Mme. de Genlis, *Les dîners du baron d'Holbach* (Paris, 1822), both of which are absolutely unreliable. Among revolutionary works representing the influence of Holbach are those of Naigeon, Holbach's literary executive, Silvain Maréchal's *Dictionnaire des athées* (Paris, An VIII), and two books of J. M. Lequinio, *Préjugés détruits* (Paris, 1792), and *Philosophie du peuple* (Paris, 1796). There are doubtless many other works of a similar character that on careful study would reveal the influence of Holbach. He was even taught in the *écoles centrales* in the year VI, and Roederer treated of morals at the Institute the next year, quoting with enthusiasm from Holbach, Volney, and St. Lambert. A curious reference which may be regarded as typical of the way Holbach was received by the men of the Revolution is to be found in the introduction to his *Essai sur les préjugés* (Paris, 1822). It occurs in the account of the life of Dumarsais, the supposed author, written by the "citoyen Daube" in the early days of the Republic. "One citizen at least will be found in every village who will buy this book, and each Sunday instead of vespers or compline or a tiresome and often fanatical sermon, will read to his assembled fellow-citizens a chapter from this 'Essay on Prejudices.' And what may we not expect from country people when Dumarsais shall become their guide! The primary school teachers will read some pages of this to their pupils every day for their instruction. Instead of giving them practice in reading from the New Testament written in bad French they will teach them reading, rhetoric, and logic from Dumarsais." It would be an interesting problem to determine just how far Holbach really did influence the thought of the Revolution.

It would seem that Holbach had influenced rather widely subsequent revolutionary and radical thought. Picavet has pointed out the affinities between his system and the *attraction passioncle* of Charles Fourier, and he seems to have points of contact with Prudhomme and Robert Owen. In 1844 Louis Blanc was accusing Marx and Arnold Ruge of being the followers of Holbach and La Mettrie. On the other hand, a Marxist like Plekhanov, in his *Beiträge zur Geschichte des Materialismus* (1896), insists on the relation of Marx and Engels to their real philosophical predecessors, Holbach and Helvetius. In Germany L. Noak has sung the praises of Holbach in his *Handwörterbuch zur Geschichte der Philosophie* (1879), only to be duly reprimanded under the auspices of the

Görres-Gesellschaft. On the other hand, Holbach has been credited with influencing Max Stirner, David Strauss, and E. von Hartmann. From time to time one sees his name in socialistic writings, whereas Kropotkin claims him for the anarchists. All this leads one to suspect that an attempt to determine Holbach's influence on this school of thought might be productive of most interesting results.

Holbach is closely related to Auguste Comte. In a word, his philosophy is positivism. Men like Stupuy and Littré have recognized this and become enthusiastic admirers of Holbach and Diderot. M. Fabre notes that Holbach speaks in the manner of Comte about the correlation between biology and sociology, and M. Soury points out that in founding politics and morals on biology he anticipated Pinel and others and hit upon an idea "*qui a passé en partie dans les faits.*" This idea might have been further illuminated in a book entitled *La physique des mœurs* projected by Remy de Gourmont just before his death. It remains, however, for some historian of the social sciences to determine Holbach's share in the origin of this line of modern scientific investigation.

Holbach has touched English thought in a curious manner through his influence on Godwin and Shelley. This has been worked out by Mr. Hancock in *The French Revolution and the English Poets* (1899), but very likely could be traced further. Godwin read the *Système de la nature* in 1782 and proposed to write a work of like character for the English. Influenced by Godwin, Shelley read Holbach, Helvetius, Condorcet, and Volney, and in 1812 commenced a translation of the *Système de la nature* which he considered "a most eloquent vindication of atheism." At that time (July 29) he was at work on the third draft of *Queen Mab* and under the spell of Holbach gave Canto VI an anti-religious turn where before it had been merely anti-political. In Shelley's notes are to be found translations from Holbach, and the lines

> "A spirit of activity and life
> That knows no term, cessation and decay,"

are a transcription from the *Système de la nature*. Mr. Brailsford. in *Shelley, Godwin, and Their Circle* (1914), has shown how the enthusiasm of Mary Wollstonecraft for the education of women goes back to Condorcet and Holbach who was in a sense the first feminist.

After all the critics have finished, from Voltaire down to Brunetière, there still remain two outstanding facts to be empha-

sized in regard to Holbach: his almost unique position at one pole of thought, and his affinity with certain new sciences and intellectual movements.

Holbach stands at the end of a long process of theological disintegration. If there were opportunity it would be possible to trace this great change in the intellectual temper of Europe from the patristic period, through Catholic and Protestant scholasticism, Arminianism, Socianism, deism, rationalism, and finally to atheism. which in the eighteenth century seemed to so many thinkers the logical and inevitable conclusion of the whole matter. At any rate, one would seek far for a more drastic attempt to clear the intellectual atmosphere. Our present obfuscation is due to schools of thought derived from Spinoza and Kant, represented in theology by Schleiermacher and Ritschl, not to mention the still more primitive reactions of German romantic philosophy and English evangelicanism. Holbach was consistent throughout, and one must break with his premises or follow him to the end. The first alternative seems to have been chosen by certain schools of modern thought. Bergson derived part of his inspiration from Plotinus, whereas Eucken's romanticism was obvious. Even a scientist like James seemed to throw his weight on the side of philosophy, and there is a general tendency toward the unsettling of men's minds and a weaning them from the simple — perhaps too simple — tenets of rationalism. Abbé Galiani declared that Holbach had caused a complete bankruptcy of metaphysics. He was evidently mistaken.

There is, however, a modern school of thought that obviously harks back to Holbach and his associates. It is almost needless in the light of what has already been said to designate the physical, natural, and social scientists his *confrères,* together with those social philosophers and theorists who base their genial speculations on exact knowledge of man and his place in nature. All who are inspired by the evolutionary hypothesis are in a sense the followers of Holbach, whose central idea was the indefinite change that might be wrought in mankind by new knowledge of itself and its relations to universal nature. Holbach is shockingly modern. Many of his wildest guesses have become accepted scientific and social theory. His conception of matter as self-animated is finding expression in scientific works of the day, his inkling of the evolutionary hypothesis has long been amply corroborated, his mechanistic and unteleological notion of organic life forms a working theory for mod-

ern biology, as his idea of the continuity of the animal and human mind has more lately been taken as the fundamental hypothesis of comparative psychology. It seems needless to state how much modern social science and theory is beholden to the doctrine of materialism and a more or less biological habit of mind. One can only suggest how much Holbach with his naturalistic view of things may have contributed to what bids fair to prove a most fertile line of thought. It remains for some careful scholar to determine the value of that contribution.

The foregoing statements are necessarily brief and inadequate. The problem has been to compress a great mass of material rather than inflate a thin film of knowledge. This present paper, therefore, can scarcely be considered more than a catalog of facts, a kind of guide-book to Holbach. There can be no doubt, however, that he deserves a more prominent niche in the history of thought than he now occupies. M. Lanson has assured me that there was a great movement *caché derrière le déisme*, namely, the anti-theistic movement led by Holbach, which has not been explored or exploited as yet. What it might yield in the way of a general clarification of thought, no one can say. At least it would form one chapter in the history of man's mind yet to be written, which, if it were done in a scholarly spirit of coolness and calm, might elucidate an intellectual problem of universal utility and interest.

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CHARLES A. MERCIER.

1852-1919.

Dr. Charles Mercier, who died on the 2d of September, 1919, was a practical alienist physician and the author of several books, of which the most important are *Criminal Responsibility*, *Crime and Insanity*, *Crime and Criminals*, and *Conduct and Its Disorders*. He was born in 1852, the son of the Rev. L. P. Mercier, a clergyman of Huguenot descent, and as his family was left badly off on his father's death, his early years were spent as a cabin-boy and warehouseman in a woolen warehouse in the city before he took up medicine as a career. He took a high degree at the London

University, and became F.R.C.P. and F.R.C.S. The bent of his mind was toward the study of mental diseases and he gained a wide practical knowledge of these as medical officer in charge of the Bucks County Asylum and the City of London Asylum at Stone. He strenuously advocated a bill to legalize the treatment of insanity in its early stages, which was more than once brought before the House of Lords. In January, 1919, he was awarded the Swivey Prize for his book, *Crime and Criminals*, the same award he had received ten years before for his *Criminal Responsibility*, a work dealing especially with the psychological aspect of crime, and the states of mind accompanying criminal actions. This original work was the first to establish firmly the doctrine of taking into account grades of responsibility or just liability to punishment in all criminal charges. In *Crime and Criminals* Dr. Mercier, reacting against the theories of Lombroso, repudiates the idea that the criminal has any fundamental difference from ordinary men. To him "every man is a potential criminal," and the perpetration of crime is consequent upon a temptation which exceeds the resisting power or "breaking-point" of the individual. Dr. Mercier, besides his studies in psychology and insanity, was an opponent of Sir Oliver Lodge, and others who believe in the survival of human personality.

Of the subjects of which Dr. Mercier possessed a specialist's knowledge he wrote with a vigor and breadth of view not always found in specialists, and his work is marked by independence of authority and originality. He is not so fortunate in his parergon, *A New Logic*,[1] where he attacks what he imagines to be Aristotelian logic with the vigor of complete misapprehension; assuming that logic "is much in the same position that was occupied two hundred years ago by witchcraft. Without being formally attacked, it is crumbling to ruin, and losing its hold upon the minds of men."

[1] London: Longmans Green and Co.; Chicago: Open Court Publishing Company, 1912. Cf. *The Monist*, Vol. XXVIII, pp. 302ff.

BOOK REVIEWS AND NOTES.

SOME SUGGESTIONS IN ETHICS. By *Bernard Bosanquet, D.C.L., LL.D,* Fellow of the British Academy. London: Macmillan and Co., Ltd., 1918. Pp. viii, 248. Price, 6s. net.

This is an extremely interesting work by an able and distinguished philosopher. It not only consists of varied topics, but is in many places lighted up by apt concrete illustrations. The subjects of the chapters are: Living for Others; The Social Good; Value and Goodness; Unvisited Tombs; Doubting the Reality of Evil; How Is One to Know What to Do?; Something Worth Knowing; On the Growing Repugnance to Punishment; We Are Not Hard Enough on Stupidity.

I shall select only a few points for critical reference. The treatment of "Value and Goodness" is not in all respects quite unexceptionable. On p. 49 we have "worth or goodness"; on p. 57, "goodness or value"; on p. 58, "value, worth, or goodness"; on p. 64, "value or goodness"; and already on p. 49, "value and goodness." Value and goodness are found with both "and," and "or," between them. Such a use of the word "goodness," without explication, in a work intended only for "ordinarily thoughtful persons," does not, in view of its usual connotations, seem quite commendable or happy, and surely value and worth might have sufficed. Some extenuation for his use of the term might be found, however, in the fact that Dr. Bosanquet does not seem to adhere very strictly to the class of reader intended, for on pp. 67, 69, we find him dropping into talk to "the student," and on p. 68 to "the philosophical student." The treatment of value here seems rather loose, and lacking at points in qualities of precision and discrimination. In speaking of the satisfaction realized in value-experience, he tells "ordinarily thoughtful persons" that "to ask whether it is a matter of intellect or of feeling appears unintelligent" (p. 57). Most of them, probably, will think it would be "unintelligent" not to ask even so little, and may retort that Dr. Bosanquet himself has asked it, or he could not have said, "It is appreciable therefore both by reason and by feeling, and must always in some degree be evident in a reaction upon both, although either may predominate." Here he is content to leave the matter. Happily not all philosophical writers on value have been content without asking more, to wit, the extent and significance of this acknowledged "predominance"—of reason or of feeling. The result has been the distinction of reason or truth values from will and feeling values, which would have done more to elucidate the subject of value than anything Dr. Bosanquet has advanced. As things are, nothing is done to show that, though objects "satisfy desire" or have "the property of satisfactoriness," their truth is not thereby established. In other words, no hint is vouchsafed of the fact that a value-judgment is not a truth-judgment. In a much later chapter he claims, indeed, that knowledge of values "involves knowledge of facts in a certain way and bearing" (p. 229).

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"A certain way and bearing" may leave delightful scope for lack of thoroughness as to the world of truth and fact. The statement that "truth" is "a value" is one for proof rather than loose assertion, and creates the unfortunate impression that truth is hopelessly relative, to which there will be many a demur. If truth was to be taken as "a value," the sense—that, namely, of its being the satisfaction of a want—should have been explicitly shown in which it was to be so regarded. The unsatisfactoriness of the truth reference may be largely due to its meagre and casual character, but the subject is too important for loose indefinite treatment.

The fourth chapter, on "Unvisited Tombs," is an interesting one, but two of its pronouncements will provoke dissent. It insists, rightly, that value is individualistic, and the theory of values directed to high achievement, but something of the nature of self-contradiction and anti-climax awaits us when it is said (p. 85) that "the honor and responsibility of an achievement can never truly and justly be laid upon any individual, not even in the crystallized achievements of poetry, knowledge, beauty." Such a pronouncement is likely to meet with as little acceptance as it deserves. There is not much incentive to moral strenuousness about it. Every one knows and admits that heredity, time, environment, etc., have something to do with the making of individual achievement, and you may therefore say, if you please, that it does not belong wholly or solely to the individual; but Dr. Bosanquet himself expressly recognizes that there are "disvalues" that might keep the achievement from being realized, so that the fact that the individual does not allow these to keep him from realizing the achievement makes it "truly and justly" *his* achievement—which, without him, were not achieved; and there is, therefore, a true and well-recognized sense in which the "honor and responsibility" belong to him. The "honor and responsibility" of being a Plato, a Dante, a Shakespeare, are "truly and justly" theirs, all accessory facts notwithstanding. "The general indivisible spirit of things" has not obliterated moral distinctions, and reduced the world to a blank, inane, featureless unity.

Again, it is said (p. 85) there is no need for "primary reliance on individual survival as instrumental to continuing or completing in his own person his earthly functions or their analogue." One's work, he goes on to say, seems to be "resuming its absorption in the general thought and effect of the world." What is said in that connection is true enough of the work, but is largely irrelevant to the question of the worker and his survival, which is the point in hand. An "absorption" of his work in the "general human value" will never content souls that have achieved high values; they will still claim the wages of going on and not to die. The values, Dr. Bosanquet himself has said, "wholly apart from persons would be nothing" (p. 11): that being so, what is more natural and congruous than such "primary reliance" of the persons embodying value "on individual survival" for the spiritual continuity, persistence, and expansion, of those values. It does not speak highly for philosophical progress that the century-old answer of Fichte to Dr. Bosanquet's "student" and "statesman" would have been higher and more assured than Dr. Bosanquet's, for he would have asked them to say in almost so many words, "As surely as I am, my existence is a thought of God; whatever I am, in and by this thought, I am before all time, and do remain independent of all time and change. This thought will I strive to know—to its fulfilment will apply all my powers; then

shall they be employed on what is eternal, and their result shall endure for ever." In any case, the two pronouncements of Dr. Bosanquet do not impressively make for the strengthening of the sense of individuality, and they are not so much ethical as merely ontologic.

There is a great deal in the chapter on "Doubting the Reality of Evil" to which I can give cordial assent, so much so that I am only reluctantly critical. Nevertheless, it does not seem to me to get to the heart of the subject. Its weakness lies in respect of essential moral evil. There is a Leibnizian strain running through it, and our finiteness and narrowness are accordingly emphasized. But, when everything favorable is said, there remain the same radical defects as are found in the Leibnizian philosophy of evil. Because developing being must be imperfect, it does not follow that it must be the prey of moral evil, and it is absurd to treat liability to evil as though it were evil itself. The essentially inward and ethical nature, quality, and conditions, of moral evil are inadequately grasped and grappled with. Dr. Bosanquet does indeed speak of "biassed choice," but the grave alternatives of moral choice are not pressed home to the seat or citadel of the situation. Thus, while one has largely enjoyed and endorsed his account, the unwilling conclusion of inadequacy forces itself upon the mind.

These critical references must not be allowed to obscure the fact that the book in whole makes good reading, and contains much sensible advice and many excellent suggestions. I heartily commend what its chapters have to say on life, literature, and art, as timely, sound, and wholesome.

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ESSAYS IN COMMON SENSE PHILOSOPHY. By *C. E. M. Joad*. London: Headley Bros., Ltd., 1919. Pp. 252. Price, 8s. 6d. net.

How far may the amateur trespass upon the province of the philosopher is the question suggested by Mr. Joad's essays. He attacks certain philosophical problems as an intelligent foreigner and translates them into plain language for the plain man, and in so doing he is serviceable to the plain man, in providing him with a lucid, non-technical introduction to one or two questions.

The essays expound the New Realism, and are as the author claims, "sufficiently philosophic to sound singularly like nonsense to the plain man, while they are sufficiently akin in spirit and conclusions to the plain man's view of the every-day world as we know it to appear pedestrian and unsatisfying to most philosophers." He abandons any attempt to synthesize and unify the conflicting appearances of a world of sense into a correlated self-explanatory whole, and accepts an aggregate of things without apparent design or structure. He applies the realistic attitude of mind, as defined in the Introduction, to the relation of thought to temperament, pointing out that a man's philosophical opinions are really colored by his temperament, and to the theory of the State, dissenting here from the orthodox political theory as put forward by Hegel, T. H. Green, and others. The New Realism, which he recommends, "has taken much of the stuffing out of philosophy," and Mr. Joad's book, treating salient problems more shortly and less ambitiously than most philosophers have treated them, has its uses, and can be read with profit. M. J.